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ABSTRACT

Most librarians know the importance of disaster preparedness. Many disasters could have been prevented altogether or have had reduced impact if institutions had been better prepared. This resource guide suggests how disaster preparedness can be achieved at cultural institutions. Twenty-three basic resource articles are presented to introduce disaster preparedness. They deal with the safety of collections rather than the safety of staff, and related issues such as security and environmental control are not addressed. Of the materials that cover what to do once a disaster has occurred, most emphasize water damage because so many causes of disaster result in water damage. The resource guide is supplemented by a list of 23 selected readings. When a choice had to be made between a readily available source and one that was difficult to obtain, the hard-to-obtain one was included in the resource guide, and a reference to the other was provided in the bibliography. The basic processes for disaster preparedness include: (1) brainstorming potential disasters; (2) investigating responses to past disasters; (3) outlining a disaster plan; (4) determining remaining needs; and (5) developing recommendations. (SLD)

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Preservation Planning Program

Disaster Preparedness

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February 1993

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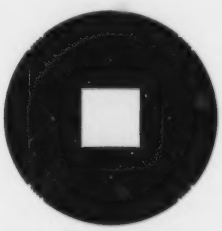

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Preface

This is one of seven in a series of Preservation Planning Program (PPP) resource guides. Support for their preparation was provided by a grant from the National Endowment for the Humanities. The resource guides offer libraries comprehensive, easy-to-use information relating to the major components of a preservation program. The goal in each case is to construct a conceptual framework to facilitate preservation decisionmaking as it relates to a specific program area. ARL was fortunate to be able to draw on the extensive experience of a diverse group of preservation administrators to prepare these resources. Guides cover the following topics:

- Options for Replacing and Reformatting Deteriorated Materials
- Collections Conservation
- Commercial Library Binding
- Collections Maintenance and Improvement Program
- Disaster Preparedness
- Staff Training and User Awareness in Preservation Management
- Organizing Preservation Activities

Taken together, the guides serve as points of departure for a library's assessment of current practices. From the rich and diverse preservation literature, materials have been selected that relate principles or standardized procedures and approaches. The intent is to provide normative information against which a library can measure its preservation efforts and enhance existing preservation activities or develop new ones. The resource guides build on the body of preservation literature that has been published over the last decade. Every effort has been made to reflect the state of knowledge as of mid-1992.

The resource guides were prepared primarily for use with the *Preservation Planning Program Manual* developed and tested by the Association of Research Libraries, with support from the National Endowment for the Humanities. However, they prove useful to all those involved in preservation work in academic and research libraries. The guides may be used individually or as a set.

Each resource guide is divided into four sections. The first presents an overview and defines the specific preservation program component. The second section guides the review of current practice, explores the developmental phases that can be expected as a preservation program component develops, and lists specific functions and activities. The third part brings together key articles, guidelines, standards, and excerpts from the published and unpublished sources. The last section contains a selected bibliography of additional readings and audiovisual materials that provide additional information on a specialized aspect of each topic.

As libraries continue efforts to plan and implement comprehensive preservation programs, it is hoped that the resource guides will help to identify means of development and change and contribute to institutional efforts to meet the preservation challenge.

Jutta Reed-Scott
Senior Program Officer for Preservation and Collection Services
Association of Research Libraries

INTRODUCTION AND PROGRAM DESCRIPTION

Introduction

Most librarians know the importance of disaster preparedness. Many have faced wet books due to a leaky roof or malfunctioning plumbing. An unfortunate few have watched their institutions suffer the reeling blow of a major disaster, such as the two attacks of arson at the Los Angeles County Public Library in 1986, which resulted in the total destruction of 400,000 books and smoke and water damage to 1,250,000. Those fortunate few who have not experienced a "disaster" (a word used by librarians and archivists to mean an unexpected event with destructive consequences to their collections), have certainly heard and read about disasters.

Many disasters could have been prevented altogether or, at the least, had a reduced impact on collections, if the institutions had been better prepared. Yet, despite this, many libraries and archives are still not adequately prepared for disasters, and many lack written disaster plans.

Purpose and Scope of this Resource Guide

This resource guide is intended to suggest how you can achieve disaster preparedness at your institution.

The main purpose of this resource guide is to make preparing for disasters in your institution less onerous by gathering together some basic resources for the endeavor. These sources were selected to provide you with the best short pieces about various components of disaster preparedness. When a choice had to be made among articles of comparable quality covering the same ground, these criteria for inclusion were applied:

- Is the content up-to-date?
- Is it applicable to a variety of institutions and situations?
- Is it hard to obtain?
- Is it short enough to fit comfortably in this resource guide?

A selected bibliography has been included to point you to other valuable pieces because some of the best works on disaster preparedness don't meet the criteria given above. Also, when a choice had to be made between a readily available source and one that was difficult to obtain, the hard-to-obtain one was included in the resource guide and a reference to the other provided in the bibliography.

The scope of this resource guide is limited to the safety of collections housed in cultural institutions and leaves the issue of the safety of people to other sources. Related issues, such as security and environmental control, while key, will not be dealt with in this resource guide. Because outbreaks of mold and insect infestations are certainly "unexpected events with destructive consequences to the collections," they are included.

Of the materials in the resource guide that cover what to do once a disaster has occurred, most emphasize water damage because so many causes of disaster result in water damage. Fires are usually extinguished with water, earthquakes can cause fires and break pipelines, and hurricanes and tornadoes are often accompanied by flooding. Water damage requires immediate response to stabilize the condition of the collections and to keep mold at bay. Fire damage, while very destructive, does not require immediate response once the threat of fire has been removed, unless the materials are wet.

How to Use this Resource Guide

Read the entire contents of the resource guide and obtain items from the bibliography that appear useful to your situation. A good place to start is by reading "Disaster Planning: Writing & Implementing Plans for Collections-Holding Institutions" by Mildred O'Connell. Although it was not written recently (1983), it provides a good introduction to the importance of disaster preparedness and an overview of the steps required to plan for, and implement, disaster preparedness.

Then look over *Resource Materials for Disaster Planning in New York Institutions* written by Sally Buchanan for the New York State Library Disaster Planning Project. These guidelines are designed to help you be able to develop a disaster plan for almost any cultural institution. You can use it as your blueprint for action and supplement it with other pieces in the resource guide.

The ARL *Preservation Planning Program: An Assisted Self-Study Manual for Libraries* describes describes the processes necessary for disaster preparedness and recommends the following steps:

- Brainstorm potential disasters
- Investigate your library's responses to past disasters
- Outline a disaster plan
- Determine remaining needs
- Develop recommendations

Take active steps to prevent disasters and protect their collections from disasters. Do what you can right away, document what you do, and, as much as possible, integrate it into the everyday operations of your institution.

Some components of disaster preparedness can be based largely on efforts already completed by other people and institutions. There are many models you can tailor to your institution's needs without too much difficulty or delay, some of which are included in this resource guide or mentioned in the bibliography.

Writing the Plan: Steps for Successful Formulation

The following steps cover all points necessary for writing a disaster plan. A library should complete all the steps given below, no matter the size or state of development of its preservation program.

Step 1. Obtain the Administration's Support.
Obtaining the support of the administration is a critical element of disaster preparedness. This is essential for you to be able to devote the staff time required to carry out disaster preparedness and to fund, as much as possible, recommendations that emerge from the planning process. Keeping senior administrators informed about your progress will help ensure that your efforts dovetail with other initiatives under way in the library and its parent organization.

Step 2. Assign Responsibility.
The contents and format of a disaster plan will vary from institution to institution, as will the process for writing it. Responsibility for completing a written plan should be assigned to one person. In some small institutions, it may be necessary for all the writing to be undertaken by an individual. In general, however, it is better for a small working group (approximately 4-7 people) to spearhead the effort instead of following what Lisa Fox calls the "Lone Ranger" approach in her article "Management Strategies for Disaster Preparedness."

Step 3. Select a Committee to Write the Disaster Plan.
Selecting the best people to prepare a written disaster plan is critical to the success of the effort. The committee should include staff knowledgeable about facilities, collections, emergency plans, and previous disasters.

Step 4. Educate the Committee.
The committee should begin by reading the contents of this resource guide and any pertinent items from the bibliography. This will ensure that everyone has a basic common knowledge of disaster preparedness. Much of the rest of the committee's education will occur as the members work on their assigned portions of the plan.

Step 5. Assign Responsibility for Writing the Disaster Plan.
When the committee meets, a first step is to decide the scope of each section, including:

- What information is needed?
- Where will you search for the information you need?
- How much consultation with other staff would be useful or necessary?

After deciding the scope of each section, assign responsibility for the sections and establish a timetable for their completion.

Step 6. Write First Response Procedures.
Writing emergency procedures for what to do when encountering fire or water should be the first priority. An appropriate first response can greatly reduce the amount of damage the collections suffer. The procedures should be clear, concise, and not give too many options.

Printing first response procedures on colorful paper increases their visibility. Many institutions also laminate them so the procedures will remain legible when wet. Multiple copies should be made and widely distributed for posting, and a copy of the procedures included in the written plan.

Step 7. Compile List of Telephone Numbers.
Decide which people you would want to contact in an emergency. These might include: the library director; the person in charge of facilities; and people responsible for major areas of the collections (branch librarians, for instance). Compile a list of their names, titles, work telephone numbers, and home telephone numbers. Work out a system or "telephone tree" giving the order in which they should be contacted. Once a disaster response team has been formed, their telephone numbers should, of course, be integrated into this system.

Step 8. Compile Lists of Services and Supplies.
Compile lists of where you can obtain services and supplies needed in an emergency. The

lists "Vendors of Supplies and Services" and "Useful Addresses" from Judith Fortson's *Disaster Planning and Recovery* may save you time, as may similar lists put together by institutions in your geographic area.

Step 9. Set Collection Salvage Priorities.
In the event of a major disaster, written collection salvage priorities will inform you, the fire department, or other authorities which portions of the collection should receive attention first. Criteria to consider when making these difficult decisions can be found in Sally Buchanan's *Resource Materials for Disaster Planning in New York Institutions.*

Since this activity requires substantial involvement from collection development staff, you should start on it early. However, if it takes longer than you had expected, don't let it hold up the rest of your work. Although some people report that setting collection priorities was not difficult in their institutions, many have stated that it took longer than any other part of the plan.

Step 10. Develop a Checklist for Hazards.
Based on what was discovered during the investigative phase, write a description of the basic vulnerabilities of your institution. There are several works in the resource guide that can help you understand potential dangers. "Fire Fighters" and NFPA's "Glossary of Fire Protection Systems" give a good introduction to fire detection and suppression technologies.

Develop a checklist to identify hazards in your institution. SOLINET's "Checklist for Disaster Prevention & Protection" and NFPA's "Firesafety Self-Inspection Form for Libraries" are good models to adapt for your own use.

As Robert A. Seal points out in "Insurance for Libraries," the most important part of a comprehensive risk management program is risk reduction. At this point, it would be a good idea to make sure that your institution's insurance is adequate. Harold Roth gives ten reasons why libraries sometimes experience difficulties in settling insurance claims; these may help you focus on areas in need of improvement.

Step 11. Prepare Post-Disaster Procedures.
Several steps fall between first response and recovery. It is important not to gloss over these in an emergency, since eliminating them can lead to bad decisions. According to Sally Buchanan, these steps include:

- assessing the disaster situation
- convening the required staff and experts
- setting up a command post
- activating plans for obtaining necessary supplies, staff, and volunteers
- eliminating hazards
- controlling the environment
- initiating response plans
- documenting activity
- providing services
- supervising
- communicating

- organizing the recovery phase, and
- concluding the initial response

"Outline for a Flood Preparedness Exercise" by Walter Henry covers all the main points for the recovery and salvage of most water-damaged library materials. Betty Walsh's chart on the salvage of water-damaged collections can help you keep the differences straight about how different types of paper, books, paintings, floppy diskettes, sound and video recordings, and photographs should be handled when they have been damaged by water. Lois Olcott Price's article on mold will help you plan what to do if you discover mold in your library.

Step 12. Form a Disaster Response Team.
Some institutions have found it helpful to form two different types of teams. The first consists of a cadre of people (with back-ups) who are highly trained in the technical and hands-on aspects of disaster response, recovery, and salvage. In a relatively small disaster, they would work directly with the damaged materials. In a major disaster, they would serve as the trainers and supervisors of teams of staff and volunteers. This group should be composed of people who possess common sense, perform well under pressure, are comfortable giving instructions to others, and would not have other major responsibilities during a large collections emergency.

The second team is formed of people who would naturally become involved in anything more than a minor disaster. Examples of people who might be in this group include the library director, head of facilities, head of accounting, head of public services, head of collection development, etc. This group needs to be informed about disaster preparedness, what their roles would be, and the need for coordination. For instance, the head of accounting might have to set up contracts and keep expenditures straight, while the head of public services would need to keep very close to the disaster decision-making in order to keep the public informed about access to the collections.

Step 13. Compile List of Telephone Numbers for Disaster Team.
Compile a list of the disaster team members' names, titles, work telephone numbers, and home telephone numbers. Integrate the disaster team into the "telephone tree" you developed earlier.

Step 14. Assemble Supplies.
It's a good idea to place enough supplies to respond to a small emergency at strategic locations throughout the library. Most works on disaster preparedness suggest what should be kept on hand, such as: polyethylene sheeting, mops and buckets (wet/dry vacuums are better if you can get them), fans, extension cords, boxes, tape for boxes, paper towels or unprinted newsprint, wax paper, pads of ruled paper, pens, and waterproof marking pens.

Step 15. Organize Training Sessions.
A written disaster plan does little good if it isn't reinforced through training. The disaster response team should receive hands-on training with water-damaged materials. Although handling wet library materials is not difficult, a team that has never done it lacks confidence. Run-throughs based on possible scenarios can provide very useful experience. "IELDRN Stages Disaster Recovery Workshop" gives an example of how one such workshop was organized. Having regular meetings can keep the team apprised of new ideas and literature about disaster preparedness.

Step 16. Establish Schedule for Review.
Assign one person to review the entire plan at least once a year and update the lists of telephone numbers more frequently, if that is warranted. The same person can also be responsible for maintaining supplies and equipment.

Step 17. Finish Written Disaster Plan.
Pull together all the documents the committee has prepared so far, generate a table of contents, and make the finished plan easy to use. Submit it to the administration for approval and allocation of funds necessary for its implementation. Make sure everyone who needs a copy of the plan has one both at home and at work. Limit the copies with sensitive information, such as collection salvage priorities, and keep track of them. Have one person responsible for version control.

Step 18. Correct Hazards.
Correct whatever hazards you discovered during this process that can be remedied without much difficulty. You probably will not be able to correct all the inadequacies unearthed during the planning process right away. Work toward implementing the recommendations developed in the earlier investigative phase.

Cooperation

Cooperative disaster preparedness offers benefits to participating institutions; Lisa Fox describes many of the advantages in "Management Strategies for Disaster Preparedness." However, cooperation does not release you from the responsibility of developing a plan tailored to the needs of your own institution's collections. There are several different models that can be examined. One such model, *Basic Guidelines for Disaster Planning in Oklahoma*, is included in this resource guide. The New York State Library Disaster Planning Project sponsored cooperative workshops throughout the state and produced a *Disaster Preparedness Planning Resource Packet* geared specifically to the needs of New York State cultural institutions. Part of this packet, *Resource Materials for Disaster Planning in New York Institutions* by Sally Buchanan, is a cornerstone of this resource guide.

Conclusion

There are many reasons why institutions do not have written disaster plans: many of them are captured in the single sheet entitled "Common Pitfalls in Emergency Planning." It is to be hoped that this resource guide will, depending upon your state of readiness, give you enough guidance to begin development of a written disaster plan, assist in completion of a plan already under development, "fine tune" your existing disaster preparedness routines, or, perhaps, simply reassure you that your existing plan is adequate to meet any disaster.

Ironically, disaster planning is one are where we can learn from the misfortunes of others. We can read accounts of actual disasters and read the distillation of experience found in "how-to" manuals and apply their lessons to our own situations.

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RESOURCE MATERIALS
FOR
DISASTER PLANNING IN NEW YORK INSTITUTIONS

Prepared for
The New York State Library Disaster Planning Project

by

Sally A. Buchanan

in cooperation with

The New York State Office of Cultural Education
and Division of Library Development

and

Northeast Document Conservation Center

Contents:

1. Introduction
2. The Planning Process: Basic Steps
3. Contents of a Disaster Plan: Basic Elements
4. Disaster Planning: A Self-help Guide

November - 1988

INTRODUCTION TO

DISASTER PLANNING: A SELF-HELP GUIDE

In 1988 the State of New York published the landmark document Our Memory At Risk. One of the expressed concerns was the need for disaster preparedness and assistance for the rich library and archival collections of New York. In response, the Conservation/Preservation Program of the State Library (C/PP) sponsored a pilot project in cooperation with the Northeast Document Conservation Center to assist New York institutions in the necessary task of preparing for emergencies. Sally Buchanan served as Project Consultant, and provided two workshops for representatives of libraries, archives, other collections-holding institutions, and a number of cooperative resource agencies from across the state.

The materials included in this resource packet were developed for these workshops. It is easiest to write an emergency or disaster plan after attending a workshop designed to help make the planning process easier, but if that has not been possible, these guidelines will assist you to develop a plan for almost any institution.

Try to read as many references listed in the disaster planning bibliography as possible before you start. The hardest parts of writing a plan will be knowing

-- How to begin
-- How to get the help you need
-- How to keep the process going forward to completion.

Read through the guidelines. If you have questions, call the Conservation/Preservation Program at the State Library (518-474-6971) for clarification. Each component or section is intended as a model to be adapted for your organization's special needs. You will need to answer the questions or gather the information appropriate to the size, location, and nature of your institution. Basic lists of supplies, suppliers, and services are included in the package, but it is important to locate resources close to home, and to make arrangements for the loan or rental of equipment or freezer spaces in advance.

You may decide that for your collections or your institution, one or more components of this guideline can be omitted. For example, your library/archives/historical society/records center may be so small that priorities for salvage are not important. Or your funds may be so limited that prevention has to be limited to locking doors and windows, shovelling snow, and cleaning gutters. But be sure you include everything the least knowledgeable staff person will need to know if and when there is an emergency in the collections. The decision about what your plan should cover needs to be informed and deliberate, to protect yourself and your collections.

Once it is written, your disaster plan should be updated once a year. Loan agreements, contacts, and phone numbers should be confirmed at that time.

THE PLANNING PROCESS: BASIC STEPS

1. Ask for all of the information the Conservation/Preservation Program has in its files about disaster planning, sample disaster plans, networks, lists of experts, lists of supplies and equipment. Use the materials included in this resource packet. You don't have to reinvent the disaster wheel.

2. Contact other people in your region or in the state who have written disaster plans. Ask for their advice and a copy of their plans.

3. Consider how your plan will be used, and who might be called upon to use it. After you write a rough draft, ask someone who doesn't know your building and collections to critique it. His/her feedback will be helpful.

4. Talk to the police and fire personnel who serve you. You can educate them about your building and collections.

5. Learn how to treat damaged materials to salvage the greatest number.

6. Include guidelines in the plan that say how you want materials to be handled, salvaged, and rehabilitated.

7. Set up an informal network of people willing to help in an emergency.

8. Have at least a limited number of supplies on hand to speed response.

9. Remember that the Northeast Document Conservation Center in Andover, MA (508-470-1010) offers free disaster-response advice over the telephone.

The planning process should include the following basic steps:

- Identify and assign responsibility
- Educate committee and community
- Define the scope of the plan
- Establish goals and timetable
- Develop reporting schedule and reporting lines
- Assess collections and set priorities
- Identify potential hazards
- Assess prevention and protection needs
- Consider fiscal implications
- Write the plan
- Distribute plan and train staff
- Assess planning process (and write a report)

CONTENTS OF A DISASTER PLAN: BASIC ELEMENTS

A complete disaster or emergency preparedness plan will include most or all of the following elements. The resource packet includes samples and instructions.

1. Table of contents
2. Introduction
3. Emergency information sheet
4. Telephone or reporting tree
5. Collection priorities (and locations)
6. Prevention and protection measures
7. Disaster response plans and instructions
8. Disaster recovery plans and instructions
9. Resources (supplies, services, experts)
10. Rehabilitation plans
11. Appendix (attachments or detailed information appropriate to your plan and your collections)

DISASTER PLANNING: A SELF-HELP GUIDE

Prepared for

The New York State Library
Disaster Planning Pilot Project

by

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Brackets indicate instructional materials included in these guidelines. Some (e.g., a table of contents), should be included in your institutional emergency plan.

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1. EMERGENCY INSTRUCTION SHEET

This sheet should contain in brief and easy-to-read steps all the instructions that any staff member, volunteer, or student would need to know in case of an emergency affecting the collections. Copies of this one-page instruction sheet should be posted near all staff telephones and at public service desks. All staff should receive education in its use. Examples of what it might contain are listed below.

FIRE:

1. Call: _____(fire dept.)_____(phone no.)

2. Assist in evacuation of building

3. Notify: _____(Library Director)
_____(disaster response person)
_____(your immediate supervisor)

WATER:

1. Call: _____(plumber, facilities staff)
_____(disaster response person)
_____(your immediate supervisor)

From above:

2. Cover stacks with plastic sheet located:
_____
_____
_____(locations) OR

3. Move books off shelves using booktruck OR

4. Carry books to another location.

From below:

5. Move books higher on shelves OR

6. Move books off shelves to another location using booktrucks.

Continue to list brief instructions relevant to the building, collections and location. Make them clear, so that even excited staff will understand and know what to do.

2. INTRODUCTION

All disaster plans should have a brief introduction explaining their use, instructions for updating, personnel who are responsible for implementation and response, funding sources, and any other general and useful information.

These sample disaster plan guidelines are directed only at collections. It is assumed that the emergency plan for people is already in place and is rehearsed regularly.

Disaster plans will vary in content and detail from one institution to another depending upon a variety of factors including the complexity and size of the collections, the potential for exposure to physical hazards, both internal and external, abuse by the public, the size of the building and the stability of its environment, the staff employed as well as their expertise, and the source and availability of funding.

Plans may be short and succinct or extremely detailed. It is important to establish at the outset of the planning process what kind of plan is suitable for the institution's needs, and how this can best be achieved, e.g., a committee, one or two people, with the help of an outside expert, etc. All disaster preparedness planning should take into consideration the following concerns:

- prevention
- protection
- response
- recovery
- rehabilitation

A planning team may decide that one or another of the components is not relevant for its library or archives. But the decision should be deliberate and thoughtful, not the result of oversight, lack of interest or expertise. The final result should be a clear plan which could be consulted and used for action by anyone responsible in times of emergency.

The plan should be distributed widely to all administration, fire, security, and facilities personnel, as well as appropriate library/archival staff with discussion about its contents and instruction in its use.

3. COLLECTION PRIORITIES

This page contains one of the more important results of the planning process. At a glance it will tell you, the fire department, or other authorities which parts of the collections are to be protected or salvaged first, second, etc. if that terrible decision ever has to be made. When such priorities have been established ahead of time, it eases the stress of disaster recovery by indicating which collections can be left until last to dry, which can be replaced without doubt, which are rare and valuable, which have value as scholarly works but not as works of art, and so on. Priority decisions can be based on a number of considerations:

- Monetary value as a finite collection or as individual rare items
- Irreplaceability
- Ability to replace in the same or other format
- Value in supporting the mission of the institution, e.g., undergraduate education or public access
- Scholarly resource
- The breadth or depth of the collection
- Fragility of the medium, e.g., film or magnetic tape or vellum
- Kind of disaster or length of exposure time, e.g., a film-based collection exposed to fire or high heat would be a low priority because most would be unsalvageable anyway
- Value to the region, state, or nation
- Value for continuing or restoring institutional operations (e.g. payroll, purchase orders, catalog, shelflist, etc.)

SUL LIBRARY/DEPARTMENT SALVAGE PRIORITIES

Library/Department:_____ Date:_____
Head/Chief:_____ Location:_____

Briefly describe parts of the collections which should have top priority in salvage operations in the event of a disaster/emergency which may be potentially damaging to all or large parts of the library/department. Include any top priority parts of the collection shelved in another location as well. If an index or catalog of a collection is itself top priority, be sure to indicate it on this form.

COLLECTION	LOCATION	TYPE OF MATERIAL	AMOUNT	CONSULTANT
List in order of priority and describe briefly	Building, room, level, range, etc.	Books, manuscripts, maps, film, etc.	Vols.,boxes shelves, etc.	Staff able to advise about collections
1.				
2.				
3.				
4.				
5.				

4. EMERGENCY REPORTING CHART

The purpose of this chart is to provide all the important names and phone numbers the planning team feels should be listed in the disaster plan. If there are people on the list who are critical to the smooth operation of a response and/or recovery effort, or a telephone information system, be sure to list a backup name and number in case the first person is not there. Keep this list updated regularly. Examples might be:

	Name	Telephone Number
Police	_____	_____
Fire	_____	_____
Facilities Head	_____	_____
Security Head	_____	_____
Preservation Head	_____	_____
Institution Director	_____	_____
Assistant Director	_____	_____
Department Heads	_____	_____
	_____	_____
	_____	_____
	_____	_____
Curators	_____	_____
	_____	_____
	_____	_____
Others	_____	_____
	_____	_____

5. PREVENTION

This section contains all the information about preventive measures implemented to avoid disaster, to reduce its potential, or to minimize the results if it should happen. In order to prevent disaster it is necessary to understand the hazards first. Internal and external surveys will reveal problems which require attention such as:

- trash buildup
- leaky roofs
- gutters clogged with leaves
- broken windows
- peeling paint indicating a moisture problem
- mold or mildew on walls or window sills
- cockroaches or rodents

Information might include details about the hazardous geology or geography of your location, and schedules for services such as checking the fire prevention system, tree trimming, cleaning sewers or drains. This section might contain training or education guides for staff in preventive measures such as use of fire extinguishers, leaving fire doors closed, insect awareness, etc.

On the following pages are hazard survey forms developed for other institutions. They may prove useful in designing your own.

SAMPLE SURVEY FORM: INTERNAL HAZARDS

Name _____ Date _____

(Check appropriate column)

	Acceptable Yes	Acceptable No	Action Required	Completed
1. Ceilings:				
2. Walls:				
3. Windows/skylights:				
4. Electrical systems:				
sound				
adequate outlets				
multiple plugs				
5. Pipes and plumbing:				
joints				
valves				
drips				
6. Heating, ventilating and air-conditioning systems:				
7. Fire detection equipment:				
8. Fire suppression systems:				
9. Water detection equipment:				
10. Security alarms:				
11. Trash:				
12. Housekeeping:				
13. Stack areas:				
shelving				
exits				
collections off floors				
14. Construction projects:				
Other:				
Comments:				

SAMPLE SURVEY - EXTERNAL HAZARDS

Name: _____ Date _____

(Check appropriate column)

	Acceptable Yes	/ No	Action Required	Completed
1. Building:				
2. Roof:				
3. Drain pipes/gutters:				
4. Windows/skylights:				
5. Trees:				
6. Landscaping:				
planters				
garden beds				
other				
7. Water hazards:				
irrigation				
fountain				
fire hydrant				
natural drainage				
other				
8. Fire hazards:				
brush				
outside fire protection				
location				
other				
Other:				
Comments:				

SUL LIBRARY/DEPARTMENT DESCRIPTION

Library/Department: **Date:**_____

Building:

Location:

Rooms:

Protection:

Access:

Points of Interest: Problems

6. PROTECTION

In this section you may place all the information about the protective measures you have taken, or wish to take, to safeguard the building, equipment, and collections. Typical examples are:

- Locations of smoke and fire alarms
- Information about the fire suppression system
- Security measures (If the plan will be widely distributed this portion should be removed from general distribution copies.)
- Environmental control measurements and data
- Location of supplies and plans for replacing used ones
- Lists of consultants, experts, services, supplies, equipment with phone numbers and dates for renewing contracts
- Disaster team members, phone numbers, and instructions for training

Some attachments give examples of such lists developed by regional services or individual libraries and archives.

DISASTER SUPPLIES LIST

The following supplies are good ones to have on hand to meet the immediate needs following a disaster. The first ten are minimum and essential. The second group could be collected and shared regionally.

Minimum/Essential:

1. Polyethylene sheeting in rolls to cover stack and storage ranges
2. Cutters for the plastic sheeting, preferably those containing razor blades and known by the trade name of Zippy cutters. Scissors are not good because they dull quickly and hands tire easily if much cutting is necessary.
3. Mops and buckets or better — wet/dry vacuums; brooms and squeegees
4. Fans and extension cords
5. Boxes for packing out wet materials
6. Tape for boxes and tape cutter or dispenser (filament tape preferred)
7. Paper towels — plain white or industrial brown ones or unprinted newsprint
8. Wax paper — in pre-cut sheets if possible
9. Pads of ruled paper and pens — for documentation
10. Waterproof marking pens — for marking boxes

Desirable:

11. Flashlights
12. Handtrucks and booktrucks
13. Hygrothermograph or sling psychrometer — for measuring temperature and humidity
14. Rope or clothesline — for cordoning off areas and for hanging wet material
15. Hard hats
16. Disposable gloves
17. Plastic bags
18. Portable generator(s)
19. Emergency lights

20. Six to twelve 50-gallon plastic garbage cans — to wash dirty materials

21. First aid kit

22. Camera and film — for documentation

23. Moisture meter — for determining moisture content of books and records

24. Dehumidifiers

25. Disinfectant

26. Pallets and a pallet mover

27. Hand tools (e.g. drill, hammer, crowbar)

DISASTER SERVICES AND EQUIPMENT

The following is a list of services and equipment for which you should have information in case of a collection emergency. Many of these will be available locally. Some will only be available in the state or perhaps nationally. Know how to reach them and make contact with them periodically.

1. Commercial freezers
2. Suppliers of boxes, plastic sheeting
3. Freezer trucks
4. Firms which can fumigate buildings and/or materials
5. Smoke and soot cleaning firms — for buildings and furniture, NOT collections
6. Firms which can provide dehumidification
7. Firms which can provide vacuum thermal-drying
8. Firms which can provide vacuum freeze-drying
9. Regional conservation/preservation centers
10. Book and manuscript conservators
11. Kodak processing center
12. Photographic experts and/or conservators
13. Disaster recovery experts
14. Pest control service
15. Computer reclamation service
16. Data recovery service
17. Rental trucks, pallet movers, fork lifts
18. Conservation supplies firm(s)
19. Scientific equipment suppliers — for environmental measuring devices
20. Janitorial supplies and/or services firm

PREVENTION AND PROTECTION: SUMMARY OF NEEDS

PREVENTION:

1. External Hazards Survey
2. Internal Hazards Survey
3. Environmental and Housekeeping Hazards
4. New and Remodeled Buildings

PROTECTION:

1. Human Resources
2. Water Detection Equipment
3. Fire Detection Equipment
4. Fire Suppression Equipment
5. Supplies for Protection and Recovery
6. Training
7. Controlling the Environment
8. Enclosures and Storage

7. RESPONSE

The response component should contain all the information you will need to respond to an emergency, from one wet book or record to a major disaster. It is important to plan the response and recovery sections well, because it is hard to think clearly in times of disaster. Points to consider include:

1. Who should be notified first?
2. Who assesses the situation? Has the source of trouble been eliminated, e.g., water turned off, fire controlled, windows boarded?
3. If this is not a minor incident, who is notified next? Where is the command post?
4. How are necessary staff and/or disaster team members and volunteers notified?
5. Where do they convene?
6. Who informs them about the situation and trains them?
7. Who activates plans for supplies, equipment, services? What consultants or experts should be contacted?
8. Where are deliveries to be made?
9. How are things to be paid for?
10. Is the area safe to enter? Who eliminates the hazards and how?
11. What is damaged? Is it documented precisely, e.g., by classification number or shelf location or name of collection? What kinds of materials are involved, e.g., film, rare, coated paper?
12. Is the environment being monitored and how is it being controlled?
13. How will communication, both internal and external, be handled?
14. What will be done with damaged material, e.g., leave in place, pack and remove to freezer?
15. What technologies for recovery are there? What do you need to know about them in order to respond most efficiently?
16. How is the activity being documented so you know exact numbers, dates, locations?
17. Who is supervising and how is it being done to facilitate all necessary activity?
18. Has the risk manager and/or insurance carrier been informed?
19. Who is organizing the recovery stage?
20. Who is responsible for documenting the response and writing it up?

RESPONSE: SUMMARY OF NEEDS

1. Assess the Disaster Situation
2. Convene Required Staff/Experts
3. Set up a Command Post
4. Activate Plans for Supplies, Staff, Volunteers
5. Eliminate Hazards
6. Control the Environment
7. Initiate Response Plans
8. Begin Response
9. Document Activity
10. Provide Services
11. Supervise
12. Communicate
13. Organize Recovery Phase
14. Conclude Initial Response

8. RECOVERY

In this section you should include the information which you think is important about the technologies, methods, and techniques for recovery. Instructions should contain key facts about materials which are found in your collections. For example, coated paper will stick together, probably irreversibly, if it is not frozen or prepared properly for air drying within six hours (give the details). Film-based media must be dealt with immediately and correctly (give the details) if it is a high priority. Freezing is a sound way to hold most wet materials safely while decisions are being made about drying or replacement (give the details).

- Descriptions of techniques such as vacuum freeze-drying, vacuum thermal-drying, and dehumidification. Some of the attachments describe various techniques and methods.

- Instructions for proper cleaning of mud-encrusted or contaminated collections before packing for removal.

- Instructions for packing wet materials for freezing.

- Suggestions for removing materials from buildings where the elevator is not working, etc.

Answers to the following questions and others like them will facilitate action:

1. What are the drying method or methods available to us for damaged collections?

2. Where can we obtain them? Who do we contact?

3. Who locally, regionally, statewide can we call on? Have we contacted them ahead of time?

4. Where are local supplies located? If we need more, where are they available?

5. How are we documenting activity?

6. Who will be in charge of recovery? Who will be responsible for what action/activity?

7. What kinds of funds can we realistically expect?

8. What are we willing to discard? What must we save?

9. What kind of training do we need to conduct to be prepared?

DRYING WET BOOKS AND RECORDS

There are currently five ways to dry wet books and records. All have undergone at least some minimal level of testing under emergency conditions; several have been used extensively. These are described to assist you in making the best choice given your circumstances: cause of damage, level of damage, numbers involved, rarity/scarcity, personnel available, budget available, drying service available. Advice from a conservator or preservation administrator experienced in disaster recovery can be helpful before making the final selection(s).

It is important to remember that no drying method restores materials. They will never be in better condition than the one they are in when drying begins. If time must be taken to make critical decisions, books and records should be frozen to reduce physical distortion and biological contamination.

Air Drying

Air drying is the oldest and most common method of dealing with wet books and records. It can be employed for one item or many, but is most suitable for small numbers of damp or slightly wet books and documents. Because it requires no special equipment, it is often seen as an inexpensive method of drying. But it is extremely labor-intensive, can occupy a great deal of space, and can result in badly distorted bindings and textblocks. It is seldom successful for drying bound, coated paper. The correct technique for air drying is given on page 20. (Book and paper conservators should always be consulted for the drying of rare or unique materials. They may choose to air dry items or may suggest one of the other alternatives.)

Dehumidification

This is the newest method to gain credibility in the library and archival world, although it has been used for many years to dry out buildings and the holds of ships. Large, commercial dehumidifiers are brought into the facility with all collections, equipment, and furnishings left in place. Temperature and humidity can be carefully controlled to user specifications. Additional testing is being undertaken, but the technique is certainly successful for damp or moderately wet books, even those with coated paper, as long as the process is initiated before swelling and adhesion have taken place. The number of items is limited only by the amount of equipment available and the expertise of the equipment operators. This method has the advantage of leaving the materials in place on the shelves and in storage boxes, eliminating the costly step of removal to a freezer or vacuum chamber.

Freezer Drying

Books and records which are only damp or moderately wet may be dried successfully in a self-defrosting fast freezer if left there long enough. Materials should be placed in the freezer as soon as possible after water damage. Books will dry best if their bindings are supported firmly to

inhibit initial swelling. The equipment should have the capacity to freeze very quickly, and temperatures must be below -10°F to reduce distortion and to facilitate drying. Documents may be placed in the freezer in stacks or may be spread out for faster drying. Expect this method to take from several weeks to several months, depending upon the temperature of the freezer and the extent of the water damage. Coated paper may adhere with this technique.

Vacuum Thermal-Drying

Books and records may be dried in a vacuum thermal-drying chamber into which they are placed either wet or frozen. The vacuum is drawn, heat is introduced, and the materials are dried above 32°F. This means that the materials stay wet while they dry. It is a very acceptable manner of drying wet records, but often produces extreme distortion in books, and almost always causes blocking (adhesion) of coated paper. For large numbers of materials it is easier than air drying, and almost always more cost-effective. However, extensive rebinding or recasing of books should be expected. This method is a solution for materials which have suffered extensive water damage.

Vacuum Freeze-Drying

Books and records are placed in a vacuum chamber frozen. The vacuum is pulled, a source of heat introduced, and the collections, dried at temperatures below 32°F, remain frozen. The physical process known as sublimation takes place - i.e., ice crystals vaporize without melting. This means that there is no additional swelling or distortion beyond that incurred before the materials were placed in the chamber.

Coated paper will dry well if it has been frozen or placed in the chamber within six hours. Otherwise it may well be lost. The process calls for very sophisticated equipment and is especially suitable for large numbers of very wet books and records as well as for coated paper. Rare and unique materials can be dried successfully this way, but leathers and vellums may not survive. Although this method may initially appear to be more expensive due to the equipment required, the results are often so satisfactory that additional funds for rebinding are not necessary, and mud, dirt and/or soot is lifted to the surface, making cleaning less time-consuming. Photographs should not be vacuum freeze-dried.

AIR DRYING WET RECORDS

Wet records may be air dried if care is taken to follow guidelines suggested by preservation experts. The technique is most suitable for small numbers of records which are damp or water-damaged only around the edges. If there are hundreds of single pages, or if the water damage is severe, other methods of drying will be more satisfactory and cost-effective. Stacks of documents on coated, or shiny, paper must be separated immediately to prevent adhesion. Or they must be frozen to await a later drying decision. Care must be taken with water-soluble inks as well. Records with running or blurred inks should be frozen immediately to preserve the written record. Conservators can then be contacted for advice and assistance.

If records must be air dried, the following steps will help achieve satisfactory results. Wet paper is extremely fragile and easily torn or damaged, so care must be exercised. Once wet, records will never look the same, and at least some cockling or distortion should be expected.

Equipment needed: flat surfaces for drying, fans and extension cords, clotheslines, sheets of polyester film.

1. Secure a clean, dry environment where the temperature and humidity are as low as possible. For best results, the temperature must be below 70°F and the humidity below 50%, or mold will develop and distortion will be extreme.

2. Keep the air moving at all times using the fans in the drying area. This will accelerate the drying process and discourage the growth of mold. If materials are dried outside, remember that prolonged exposure to direct sunlight may fade inks and accelerate the aging of paper. Be aware that breezes can blow away single records. Train fans into the air and away from the drying records.

3. Single pages can be laid out on tables, floors, and other flat surfaces protected if necessary by paper towels or clean, unprinted newprint. Or clotheslines may be strung close together and records laid across them for drying.

4. If records are printed on coated paper, they must be separated from one another to prevent them from sticking together. This is a tedious process which requires skill and patience. Practice ahead of time will prove useful in case of emergency. Place a piece of polyester film on the stack of records. Rub it gently down on the top document. Then slowly lift the film while at the same time peeling off the top sheet. Hang the polyester film up to dry on the clothesline using clothespins. As the record dries, it will separate from the surface of the film. Before it falls, remove it and allow it to finish drying on a flat surface.

5. Once dry, records may be rehoused in clean folders and boxes. Or they may be photocopied or reformatted on microfilm or fiche. Dried records will always occupy more space than ones which have not been water-damaged.

RECOVERY: SUMMARY OF NEEDS

Action for Water and/or Fire Damage

I. Immediate Priorities

II. Techniques for Handling and Removal

- A. Handling
- B. Removing
- C. Documenting
- D. Cleaning
- E. Packing

III. Techniques for Stabilization (Collections and Buildings)

IV. Techniques for Recovery

- A. Air drying
- B. Freeze-drying
- C. Dehumidifying
- D. Vacuum-drying
- E. Vacuum freeze-drying

V. Rehabilitation

- A. Sorting
- B. Cleaning
- C. Rebinding and Repairs
- D. Shelf Preparation
- E. Catalog Maintenance
- F. Reshelving

9. REHABILITATION

Once materials are dried they must often still be sorted, cleaned, repaired, rebound, and/or boxed, and returned to the shelves in some order. Additionally they may require new pockets, security tags, and shelf labels. If the disaster has been a large one, this sorting and rehabilitation process may take a long time.

Any plans which can be made ahead of time for staff, space, or training will help provide economies of time and expense. Planning ahead can often assist in accomplishing two needs or more with the same activity. Because the Los Angeles Central Public Library card catalog is virtually useless due to the terrible loss of 400,000 books in 1986, staff are building a computer-accessed catalog as an efficient way to identify lost materials, record the presence of salvaged ones, and bring themselves up and on-line at the same time. Keep in mind the likely needs after a major disaster for:

- drying
- sorting
- cleaning
- repairing
- binding or rebinding
- rehousing, e.g., boxes, pamphlet binders, folders
- tagging for security
- shelf preparation including labels and pockets
- changing records either on-line or at the catalog/ shelf list

RECORD OF DISASTER RECOVERY ACTIVITIES FOR LIBRARY AND ARCHIVAL COLLECTIO

The New York State Library is keeping a record of disasters involving library and archival materials. If you have such a disaster, please forward this information to the New York State Conservation/Preservation Program, New York State Library, 10-C-47 Cultural Education Center, Albany, NY 12230. Thank you for your cooperation.

Reporting Date:

Name of person filing report:

Institution:

Address:

Telephone #: ( ) -

Date of Disaster:

Nature of disaster: flood____ leaking roof____ burst pipe____ fire ____

other, please specify_____

_____

What type of material was damaged or affected? Please indicate the quantity of material affected in the space provided next to each category of material.

books_____ photographs_____manuscripts_____videotapes_____

periodicals_____microfilm_____catalogue cards_____

other_____

Indicate the level and type of damage to materials by writing a percentage of the total volume involved in the disaster next to each category below.

burned and completely lost_____saturated with water_____

damp but not saturated_____soiled and saturated_____

moldy_____

other, please specify_____

_____

_____

What did you do?

implemented salvage operation _____ called NEDCC for assistance _____

other_____

_____

_____

If you called someone for assistance, was the assistance helpful?_____

not helpful_____ If not, why_____

_____

_____

What additional help did you need? _____

_____

_____

Did your organization have a formal disaster plan? yes_____no_____

If so, did it help you respond effectively? yes_____no_____

If not, why_____

_____

May we share the information on this form with others? yes_____no_____

11. APPENDICES/ATTACHMENTS

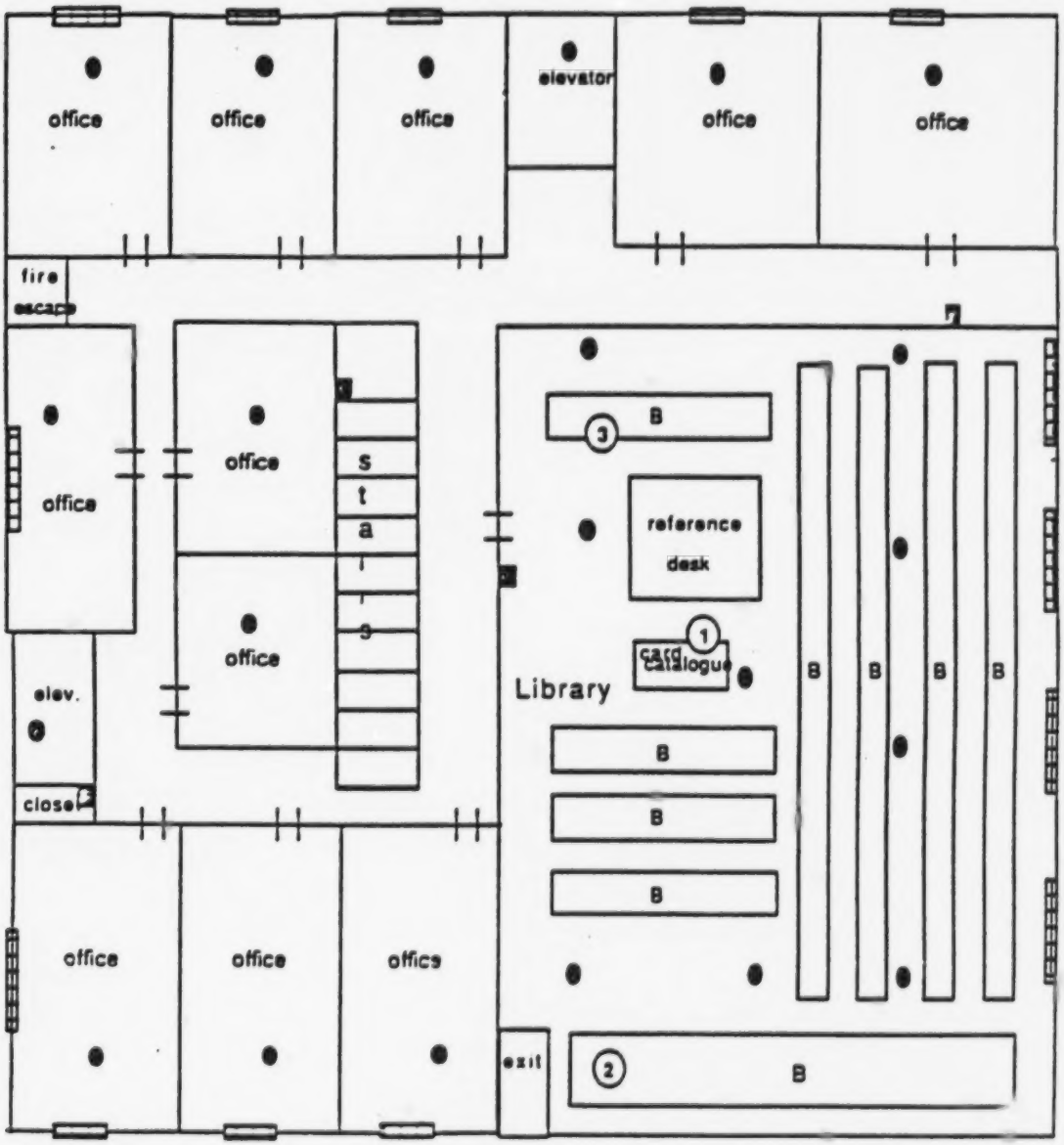
This is a reasonable place to put information you have gathered which does not quite fit in the other sections. One important inclusion is maps or floorplans of the library/libraries, archives, or other buildings housing collections you are involved with. The maps should be marked to indicate the locations of priority materials, exits, windows, corridors, shelving ranges, and any other applicable information like fire and smoke alarms and extinguishing equipment.

Other useful information might include lists of people, regional services, civil defense experts, suppliers, etc. which could prove helpful in times of crisis.

Forms, lists, or ideas from other institutions could also be placed here for quick reference.

SAMPLE FLOOR LAYOUT FOR A DISASTER PLAN

Academic Building A 3rd Floor Library and Offices



sprinklers windows

fire extinguisher B book stacks

priorities are numbered (1) (2) (3)

Sally A Buchana
1986

LOS ANGELES PUBLIC LIBRARY DISASTER RECOVERY PROJECT

INITIALS _____

DATE _____ SHEET NO. _____

GREEN	RED	RED/BLUE	BLUE	YELLOW	BLACK
Return to Shelves	Repair, & or Clean	Repair, Clean, Rebind	Rebind	Set Aside for Selector	Discard
TOTALS					

TOTAL THIS SHEET 53

12. BIBLIOGRAPHY

There are a number of good bibliographies dealing with the subject of disaster preparedness and recovery for a variety of library and archival materials including film, photographs, and magnetic media. Including them as part of your plan will allow you to find quickly a source of detailed information about materials, technologies, experts, ideas, and suggestions. Toby Murray's bibliography is one of the most extensive and current. It may be obtained free from the author:

Toby Murray
Preservation Officer
McFarlin Library
University of Tulsa
Tulsa, OK 74104

Disaster Bibliography: Selected Highlights for Management and Planning

Association of Research Libraries, Office of Management Studies. "Planning for Emergencies," SPEC Kit No. 69. Washington, DC: ARL, 1980. [This is a compilation of sound advice from a number of experts and institutions. Cost is approximately $25.00 from ARL.]

Barton, John P. and Johanna C. Wellheiser. An Ounce of Prevention. Toronto, Canada: Toronto Area Archivists Group, 1985. [Even though this is written for Canadian institutions, the information is sensible and applicable for anyone involved in disaster planning; conference proceedings also available.]

Bohem, Hilda. Disaster Prevention and Disaster Preparedness. Berkeley, CA: Office of Assistant Vice-President, University of California, Berkeley, 1978. [This is somewhat dated, but the logical and concise organization it suggests is still extremely useful and worth reading.]

Buchanan, Sally A. Disaster Planning: Preparedness and Recovery for Libraries and Archives. General Information Programme and UNISIST, UNESCO, pending, 1988. [This is a book about planning for disaster preparedness and recovery intended for a general audience; some attention is paid to needs of third world countries and smaller institutions.]

Buchanan, Sally A. "Disaster: Prevention, Preparedness and Action," Library Trends, Vol. 30, No. 2, Fall 1981. [Again, this is now somewhat dated, but the bibliography contains classic works in the field, and the advice is generic enough to provide a foundation for adding expertise.]

Buchanan, Sally A. "The Stanford Library Flood Restoration Project," College & Research Libraries, November 1979, pp. 539-48. [The second half (Phil Leighton's is the first) of a detailed account of a major library flood and the logistics and statistics of recovery.]

Eulenberg, Julia Niebuhr. Handbook for the Recovery of Water Damaged Business Records. Prairie Village, KA: Association of Records Managers and Administrators, 1986. [This does not mention books, but is strong in coverage of paper, magnetic media, photographs, and other special media.]

Hendriks, Klaus B. and Brian Lesser. "Disaster Preparedness and Recovery: Photographic Materials," American Archivist, Vol. 46, No. 1, Winter 1983, pp. 52-68. [Sound and sensible advice from one of the most reliable and respected photographic conservators.]

Leighton, Philip D. "The Stanford Flood," College & Research Libraries, September 1979, pp. 450-59. [The first half of the account of the Stanford Libraries flood (see above).]

Martin, John H. The Corning Flood: Museum Under Water. Corning, NY: The Corning Museum of Glass, 1977. [A creative account and a classic in the field of disaster recovery, "must" reading for everyone.]

Mathieson, David F. "Hurricane Preparedness: Establishing Workable Policies for Dealing With Storm Threats," Technology & Conservation, Summer 1983, pp. 28-29. [Basic and practical advice for those who live in hurricane country.]

Matthews, Fred W. "Sorting A Mountain of Books," Library Resources and Technical Services, January/March 1987, pp. 88-94. [An interesting account about the challenge of sorting and returning to the shelves books dried after a major fire and subsequent water damage.]

Morris, John. Managing the Library Fire Risk (2nd ed). Berkeley, CA: University of California Office of Insurance and Risk Management, 1979. [Another classic in the field. This is an invaluable source book for detailed information about fire protection and prevention systems and facts.]

Murray, Toby. Bibliography on Disasters, Disaster Preparedness and Disaster Recovery." Tulsa, OK: University of Tulsa Libraries, 1987. [An extensive bibliography of resources in disaster preparedness which is updated regularly and contains most of the useful information written on the subject.]

O'Connell, Mildred. "Disaster Planning: Writing and Implementing Plans for Collections-Holding Institutions," Technology and Conservation, Summer 1983, pp. 18-24. [A succinct and practical approach to disaster planning. Every planning committee should read it first before undertaking the task.]

Ogden, Sherelyn. "The Impact of the Florence Flood on Library Conservation in the United States of America: A Study of the Literature Published 1956-1976," Restaurator, Vol. 3, 1979, pp. 1-36. [This provides a bit of the history and background which led to the innovation in recent recovery techniques for water-damaged materials.]

Waters, Peter. Procedures for the Salvage of Water-Damaged Library Materials (3rd ed. in press). Washington, DC: Government Printing Office, 1988. [Waters has updated his classic pamphlet, which every cultural institution should hold in multiple copies, ready for use.]

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Conservation Administration News

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IELDRN Stages Disaster Recovery Workshop

by Randall Butler
Northern Arizona University
and
Sheryl Davis
University of California, Riverside

The Inland Empire Libraries Disaster Response Network (IELDRN) held its third in a series of disaster workshops on September 13, 1989, on the Pomona campus of California State Polytechnic University (Cal Poly). IELDRN was established in 1987 by libraries in Riverside, San Bernardino, and eastern Los Angeles counties to provide mutual aid in response to any type of library disaster (see CAN No. 34, pages 8-9). In order to accomplish this purpose, IELDRN planned three workshops to stress the goals of encouraging and assisting member libraries in writing a disaster plan and training disaster teams at member institutions.

Therese Lamontagne soaks books. Photo: Randall Butler.

The first workshop, held at Loma Linda University in March 1988 (reported in CAN No. 34), stressed disaster prevention and the need for a written disaster plan. The second workshop (previously unreported), conducted March 27, 1989, at the University of California, Riverside, provided participants from fifteen libraries with the opportunity to write component parts of a disaster plan using their own word-processing software. Both IBM and Macintosh personal computers were available for use by the participants throughout the day.

The basic elements of a disaster plan were explained in detail by IELDRN members, who then assisted the participants at their terminals in drafting sections of their plans. One highlight of the program involved demonstrations on the use of software packages to create floor plans. A UC-Riverside graphics illustrator was on hand to offer suggestions on creating floor plans and modifying existing plans to clearly show emergency equipment. These first two workshops provided the foundation for the most recent exercise, which stressed disaster team training.

*Reprinted from Conservation Administration News, volume 40 (January 1990)

A total of thirty-seven participants from museums; archives; and academic, public, and corporate libraries attended the Cal Poly workshop. Appropriately titled "Wet Book Packout: Hands-On Disaster Recovery Workshop," the workshop provided first-hand experience in packing-out or removing wet books, office files, and assorted media materials.

The day's activities were divided into morning and afternoon sessions. The morning session began with introductions of participants and supervising IELDRN members (facilitators), followed by descriptions of two recent water-related disasters at the Cal Poly University Library and the Riverside Public Library, by Sandy Hanna and Derry Juneja, respectively. A discussion of tasks and roles, led by Gloria Scott, Corona Public Library, preceded the actual packout exercise.

Participants were divided into seven teams, with each member assigned a role and specific task to perform. Team members were selected from neighboring institutions, because in a crisis, neighbors would probably be called first. Assignments in each team included Team Leader, Supply Officer, Recorder, Sorter(s), and Packer(s). A color-coded name tag designated each person's role.

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Each Team Leader was responsible for coordinating the team effort and supervising the group's packout, while the Recorder kept a record of decisions and procedures. Sorters were responsible for removing books from the shelves and transporting them on book trucks to the Packers, who in turn wrapped the materials in freezer paper and boxed them spine down.

Sorters evaluate materials. Photo: Randall Butler.

Teams were assigned three sections of materials (approximately five hundred books and other items) in two ranges, located on a patio outside the University Library. The ranges and their contents had been thoroughly soaked by library staff over a twenty-four hour period. The teams were given an hour to decide on an action plan and to remove as many materials as possible.

David Rios oversees sorting. Photo: Randall Butler.

While most teams averaged eight boxes, one managed to successfully pack sixteen boxes—best for the day. Each team was observed and coached when necessary by an experienced IELDRN mem-

ber or guest facilitator. A pallet was loaded with two dozen boxes and wrapped in plastic film to complete the exercise. The morning session concluded with a stimulating discussion, moderated by Sheryl Davis, of problems encountered and solutions devised by each team.

Teams were encouraged during the exercise to devise a recordkeeping system and code for each box to distinguish the contents as either wet, damp, or dry, and also to provide bibliographic control. Because the shelves had been loaded with discarded books in no specific shelf order, teams had to develop bibliographic schemes that offered a measure of control. Most teams decided on a scheme that numbered the ranges, sections, and shelves to help provide inventory control.

Chris Coleman oversees packout. Photo: Randall Butler.

During the afternoon, participants were divided into four groups that rotated between four stations. Instructors at each station provided demonstrations and hands-on practice in one of four categories:

*unpacking and drying wet books
*handling and drying wet papers and photos
*cleaning and removing mold, and
*dry cleaning techniques for papers and books.

The day's activities closed with a final group discussion and a presentation by Randy Butler on the psychological effects of a disaster on staff and administrators. He summarized the talk given by Dr. Joe D. Thigpen, a noted crisis management psychologist, at IELDRN's first workshop in March 1988. Butler stressed the need for administrators and staff to talk and listen to each other, and for individuals to develop personal coping skills.

The "Wet Book Packout" workshop was a valuable learning experience. The workshop was made possible by a Library Services and Construction Act Title III grant administered by the California State Library, and the generous hospitality of Cal Poly and the University's Library administration and staff.

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C.5 COMMON PITFALLS IN EMERGENCY PLANNING

APPENDIX C.5

1. LACK OF INTEGRATION - Emergency planning has not been integrated into the company's total management sytem.

2. LACK OF UNDERSTANDING - Lack of understanding of the different dimensions of planning.

3. MANAGERS NOT INVOLVED - Managers at different levels in the organization have not been engaged in or contributed to the planning activities early enough in the process to influence the outcome.

4. TOP MANAGEMENT EXPECTS IMMEDIATE RESULTS from the planning effort.

5. TOP MANAGEMENT FLEXIBILITY - Top management that is not very flexible expects that the plan, as developed, will be realized.

6. PLANNING RESPONSIBILITY WRONGLY PLACED - The responsibility for planning often is wrongly placed in a separate department all by itself. This isolation tends to be self-defeating since other departments then tend to ignore the plans.

7. TOO MUCH - TOO SOON - In starting formal planning, too much is attempted at once. The effort should begin cautiously (with due regard to timing) and thoroughly. The process can realistically be speeded up later as opportunity arises.

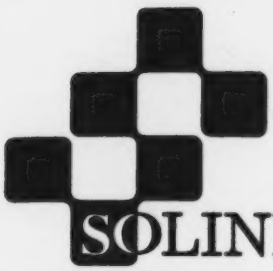
8. FAILURE TO OPERATE BY THE PLAN - Management at many levels fails to operate by the plan. This may be due to several of the factors mentioned above.

9. CONFUSING FINANCIAL PROJECTION WITH EMERGENCY PLANNING - Extrapolation and financial projections are often confused with planning. It is up to the planning coordinator to make sure that management understands the difference.

10. LACK OF BROAD INPUTS TO THE PLANNING EFFORT - One of the most common causes of failure in the planning process is lack of meaningful and timely inputs from a broad range of sources in top management down to the lowest operating levels.

11. FAILURE TO SEE THE BIG PICTURE - Many departments or managers fail to see the overall picture of planning and get hung up on little details.

Reprinted from Defence Civil Preparedness Agency. Civil Preparedness Field Training Manual SM-32.1 Participant manual for Emergency Planning Workshop for Business and Industry Conferences. Battlecreek, Michigan: March 1978.



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CHECKLIST FOR DISASTER PREVENTION & PROTECTION

Prepared by Lisa L. Fox

(July 1991)

The inspection checklist provided on the following seven pages is designed to be used as part of an institutional disaster preparedness program. Through the periodic inspections and information-gathering activities outlined here, the staff can reduce the institution's vulnerability to disaster. Some of this information will be gathered in regular tours of the building, while other elements will be ascertained in conversations with others in the organization.

The information gathered will be used primarily in two ways. First, some conditions will be found that require repair, replacement, or other maintenance activity. For example, if drains are not flowing freely from the roof, a simple cleaning will remedy that condition. Or if fire extinguishers are missing from a critical area, they may be purchased and installed. Second, the staff will identify some conditions that are not easily remediable. The existence of such conditions will alert the institution to vulnerabilities that must be considered in the institution's disaster plan. For example, if there is no automatic fire suppression capability, it may not be immediately installed. But this vulnerability should signal the disaster preparedness team to plan carefully for other strategies that will reduce the risk of fire.

In actual use, the institution will create its own checklists based on the frequency with which each item needs to be checked. Some will need attention only once or every few years (e.g., identifying the type of roof on the structure). Others will require just annual or semi-annnual inspections, as is the case with furnace and boiler inspections. Others will merit monthly monthly or quarterly attention, such as fire extinguisher inspections and examination of the plumbing.

Many of the inspections outlined here are likely to be the duty of personnel responsible for facilities maintenance. In those cases, the repository staff need only (a) develop mechanisms for learning of remedial actions that are needed and (b) verify that the inspections are done as scheduled. Those areas not included in inspections by facilities staff should be assigned to staff in the library/archives. One individual should keep copies of the completed checklists and track progress in completing repairs and other actions noted on the forms; this may be done by the administrator responsibility for the building or by the chair of the disaster preparedness committee.

Most librarians and archivists will require some education in order to carry out a disaster disaster preparedness program. A bibliography of readings (available from the SOLINET Preservation Program) will provide a good starting point. Training programs on disaster preparedness are offered by SOLINET and other organizations throughout the country. Contact the Preservation staff at the above address for further information about these.

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
1. Outdoor hazards:			
* Railings, benches, planters, light/flag poles well anchored?	☐ yes ☐ no		
* Overhanging trees/branches trimmed?	☐ yes ☐ no		
2. Building:			
* No sign of cracks/seepage visible in exterior or interior walls?	☐ yes ☐ no		
* Compliance with seismic, fire, electrical, and other codes?	☐ yes ☐ no		
3. Roof:			
* "Sloped" or "pitched" (i.e., not flat)?	☐ yes ☐ no		
* Roof covering sound? No buckling/bubbles, leaks, cracks, standing water?	☐ yes ☐ no		
* Flashing/caulking intact?	☐ yes ☐ no		
* Equipment on roof prohibited? or (if present) properly anchored?	☐ yes ☐ no		
4. Drainage: (eaves, gutters, downspouts, scuppers, drains, interior columns)			
* Connected into sewer system? Water directed away from building footings?	☐ yes ☐ no		
* Draining freely?	☐ yes ☐ no		
* Good drainage around doors?	☐ yes ☐ no		

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
5. Windows and skylights:			
* Caulking/sealants sound?	☐ yes ☐ no		
* Trees/limbs trimmed away?	☐ yes ☐ no		
6. Fire safety:			
* Fire-resistant structure?	☐ yes ☐ no		
* Concrete flooring, with no air passages between floors?	☐ yes ☐ no		
* Concealed spaces (e.g., false ceilings) identified?	☐ yes ☐ no		
* Fire detection in all concealed spaces?	☐ yes ☐ no		
* Stairways and pipe shafts enclosed?	☐ yes ☐ no		
* Electrical wiring in good condition?	☐ yes ☐ no		
* Appliance cords in good condition?	☐ yes ☐ no		
* Appliances unplugged nightly?	☐ yes ☐ no		
* Do staff have keys to mechanical rooms and janitorial closets?	☐ yes ☐ no		
* Regular Fire Marshall visits?	☐ yes ☐ no		
* Fire Marshall visits used productively? (e.g., floor plans given to Fire Department; high-priority collection areas noted; appropriate follow-up on observed Code violations)	☐ yes ☐ no		

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
(Fire Safety, continued)			
* Detection systems: - appropriate type(s) present?	☐ yes ☐ no		
- wired to 24-hour monitoring station?	☐ yes ☐ no		
- tested regularly?	☐ yes ☐ no		
* Appropriate extinguishers present? Inspected appropriately and on schedule?	☐ yes ☐ no		
* Automatic suppression system (i.e., sprinklers, Halon) present and operating?	☐ yes ☐ no		
* Staff trained in: - sounding alarms?	☐ yes ☐ no		
- interpreting annunciator panels (if present)?	☐ yes ☐ no		
- notifying Fire Dept. and others as called for?	☐ yes ☐ no		
- using extinguishers?	☐ yes ☐ no		
- turning off power, HVAC, sprinklers, gas main?	☐ yes ☐ no		
- closing fire doors?	☐ yes ☐ no		
- overseeing evacuation?	☐ yes ☐ no		

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
7. Heating, ventilation, and air-conditioning (HVAC) system:			
* Automatic shut-off capacity in event of fire?	☐ yes ☐ no		
* Furnace/boiler inspected each fall?	☐ yes ☐ no		
* Air conditioning:			
- no leaks?	☐ yes ☐ no		
- no mold present?	☐ yes ☐ no		
- effective drainage from condensation-collecting pans?	☐ yes ☐ no		
- dehumidification capacity?	☐ yes ☐ no		
- capable of operating on exhaust to reduce smoke?	☐ yes ☐ no		
8. Stack areas:			
* Shelves well braced?	☐ yes ☐ no		
* No water sources located above collections?	☐ yes ☐ no		
* Books shelved snugly?	☐ yes ☐ no		
* Shelving 4-6" off floor?	☐ yes ☐ no		
* "Canopies" atop shelving units?	☐ yes ☐ no		
* No valuable materials in basement?	☐ yes ☐ no		
* Exits unobstructed?	☐ yes ☐ no		
* Important collections away from windows?	☐ yes ☐ no		

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
9. Protection from water damage:			
* Pipes and plumbing well supported?	☐ yes ☐ no		
* No pipe/plumbing leaks?	☐ yes ☐ no		
* Water detectors present?	☐ yes ☐ no		
* Sump pumps and back-ups present?	☐ yes ☐ no		
* Appropriate dehumidifiers available?	☐ yes ☐ no		
* No leakage/seepage through walls?	☐ yes ☐ no		
* Valuable materials stored above ground level?	☐ yes ☐ no		
* Valuable and fragile media stored in protective enclosures?	☐ yes ☐ no		
* Do staff have keys to mechanical rooms and janitorial closets?	☐ yes ☐ no		
* Do staff know location of water main and have appropriate tools (if needed) for shut-off?	☐ yes ☐ no		
10. Security:			
* Book drops (if any) located away from building or in fire-resistant enclosure?	☐ yes ☐ no		
* Building exterior well lighted?	☐ yes ☐ no		
* Locks/alarms on all windows and doors?	☐ yes ☐ no		

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
(Security, continued)			
* Intrusion detectors/alarms present and monitored 24-hours?	☐ yes ☐ no		
* Effective closing procedures to ensure building is vacant?	☐ yes ☐ no		
11. Housekeeping:			
* Cleaning supplies and other flammables stored safely?	☐ yes ☐ no		
* Trash removed nightly?	☐ yes ☐ no		
* Staff room cleaned daily and well?	☐ yes ☐ no		
* Smoking prohibited?	☐ yes ☐ no		
* Food and drink prohibited? and prohibition enforced?	☐ yes ☐ no		
* Pest management strategies in place and effective?	☐ yes ☐ no		
12. Insurance:			
* Policy up to date?	☐ yes ☐ no		
* "Acts of God" covered?	☐ yes ☐ no		
* Replacement costs specified as needed?	☐ yes ☐ no		
* Staff aware of records required for claim, and those records maintained safely?	☐ yes ☐ no		
* Duplicate shelflist, catalog, inventory, and/or back-up computer tapes for entire collection?	☐ yes ☐ no		

Area/Item to be Inspected	Condition OK?	Action Required (Describe in detail)	Action Complete (date and initial)
13. Construction projects:			
• Responsibility for fire safety precautions clearly specified in contract?	☐ yes ☐ no		
• Fire guards used in all cutting/welding operations?	☐ yes ☐ no		
• Debris removed nightly?	☐ yes ☐ no		
• Fire-resistant partitions used?	☐ yes ☐ no		
• Extra fire extinguishers on hand?	☐ yes ☐ no		

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DISASTER RECOVERY SERVICES & SUPPLIES: A SELECTED LIST OF SOURCES

Compiled by Lisa L. Fox • October 1992

The following list includes companies that provide specialized services and information that may be useful in carrying out disaster recovery activities. Each entry includes the company's name, mailing address, and phone number. In the right column is a brief indication of the services or products available through each company. For information about sources of related supplies such as environmental monitoring equipment, consult the latest version of the SOLINET technical leaflet, *Some Sources of Conservation/Preservation Supplies and Equipment.*

Inclusion in this list does not imply SOLINET endorsement, nor does the omission of any supplier indicate censure. Since most of the firms included on this SOLINET list have been involved in disaster recovery operations in libraries and/or archives, they are likely to be sensitive to the special requirements of these collections.

Many other local resources can be identified through the Yellow Pages. Look under headings such as: *dehumidifying equipment*, which also includes firms that provide dehumidification services on-site and/or at their plants; *fire and water damage restoration*; *janitor service* for assistance with basic clean-up; *pest control services*, which will include fumigation as well as extermination; *smoke odor counteracting service* for firms that specialize in cleaning and deodorization; and *water damage restoration*. Local companies are likely to be less aware of current research and preferences associated with disaster recovery in libraries and archives, so the buyer must carefully evaluate them.

Before including any organization in an institutional plan, the staff should be sure to contact the company to verify that the information is correct, identify a contact person, and probably to gather cost estimates and ascertain other specific terms.

American Freeze-Dry, Inc. 411 White Horse Pike Audubon, NJ 08106 609-546-0777	a variety of recovery services, including freeze-drying, fumigation, smoke odor removal, and cleaning
American Institute for Conservation 3545 Williamsburg Lane, N.W. Washington, DC 20008 202-364-1036	referral to conservators

Blackmon-Mooring-Steamatic Catastrophe, Inc. (BMS CAT)
One Summit Avenue, Suite 202
Fort Worth, TX 76102
817-926-5296
24-hour hotline: 800-433-2940
BMS CAT also has a regional offices in Atlanta (404-457-4477) and elsewhere; the Fort rth office can provide referral to these

a variety of recovery ervices, including fire- and wate dam e reco ry

Conservation Center for Art & Historic Artifacts
264 South 23rd Street
Philadelphia, PA 19103
215-545-0613

information, especially about conservators

Document Reprocessors
41 Sutter Street, Suite 1120
San Francisco, CA 94104
800-4-DRYING or 415-362-1290

a variety of recovery services, including vacuum freeze-drying, smoke odor removal, cleaning, fumigation

Dorlen Products
6615 West Layton Avenue
Milwaukee, WI 53220
414-282-4840

water-sensing alarms

DuPont de Nemours & Co., Inc.
Fabrics and Finishes Dept.
Industrial Products Division
Wilmington, DE 19898

Mylar rolls

Eastman Kodak Co.
(Contact nearest office for information)

reprocessing of Kodak film/microfilm

Film Technology
6900 Santa Monica Builevard
Hollywood, CA 90038
213-464-3456

restoration of 16- and 35mm movie film

Getty Conservation Institute
4503 Glencoe Avenue
Marina del Rey, CA 90292
213-822-2299

information on sa ng artworks

Graham Magnetics, Inc.
6625 Industrial Park Boulevard
North Richland Hills, TX 76118
817-281-9450

salvage of com r m iia

Library of Congress — information
National Preservation Program Office
LM-G07
Washington, DC 20540
202-707-1840

Loss Control Services — information and consultation on fire protection and recovery
ATTN: John Morris
3333 Nutmeg Lane
Walnut Creek, CA 94598
415-933-3365

M. F. Bank Restoration Company — wide range of recovery services for library/archival materials, including dehumidification, drying, smoke removal and deodorization, and fumigation
6659 Peachtree Industrial Blvd.
Suite AA
Norcross, GA 30092
800-843-7284 outside Georgia
404-448-7250 in Georgia
M. F. Bank has other regional offices; for more information, contact the Norcross office or check your phone directory

Munters Moisture Control Services — dehumidification and vacuum drying
6900 Peachtree Industrial Blvd.
Suite I
Norcross, GA 30071-1030
404-242-0935
Moisture Control has regional offices throughout the country; to obtain phone numbers for these, contact the Norcross office or the national headquarters (617-388-0600)

National Archives & Records Administration — information
Conservation Lab
NNPD, Room B-1
Washington, DC 20408
202-501-5630

National Center for Film & Video Preservation — information
2021 North Western Avenue
Los Angeles, CA 90027
213-856-7637

Northeast Document Conservation Center — information about recovery, and referral to conservators
100 Brickstone Square
Andover, MA 01810-1428
508-470-1010

Odomaster Canada — *Canadian division of Unsmoke, described below*
994 Westport Crescent
Unit A-7
Mississauga, Ontario L5T 1G1 Canada
800-233-6037

Pest Control Services, Inc.
c/o Dr. Thomas Parker
44 West Essex Avenue
Lansdown, PA 10950
215-284-6249

consultation on pest control and fumigation

Randomex, Inc.
1100 East Willow Street
Signal Hill, CA 90806
213-595-8301

salvage of computer media Data Recovery Division

Raychem Corporation
TraceTek Products Group
300 Constitution Drive
Menlo Park, CA 94025
415-361-4602

water-sensing cable

Re-Oda Chemical Engineering Co.
100 Industrial Parkway
P. O. Box 424
Chagrin Falls, OH 44022
216-247-4131 (call collect)

cleaning and deodorization of fire-damaged materials

SOLEX, Inc.
2700 Post Oak Boulevard
Suite 1530
P. O. Box 460242
Houston, TX 77056
713-963-9405

on-site dehumidification and selected other services

SOLINET Preservation Program
1438 West Peachtree Street, N.W.
Suite 200
Atlanta, GA 30309-2955
800-999-8558, 404-892-0943

information and referrals

Unsmoke Systems, Inc.
1135 Braddock Avenue
Braddock, PA 15104
800-332-6037

fire and water damage restoration, deodorization, dehumidification services; plus supply/equipment sales
for Canada, see "Odomaster" entry

Wei T'o Associates, Inc.
P. O. Drawer 40
21750 Main Street, Unit 27
Matteson, IL 60443
312-747-6660

freeze-dry/extermination machine

Management Strategies for Disaster Preparedness

by Lisa L. Fox

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The ALA/RTSD (Resources and Technical Services Division) Preservation of Library Materials Section (PLMS) adopted a new section structure during 1988. That structure is significant in the development of the preservation field as a whole, for it transforms the Section's Executive Committee from its previous role of acting as a monitor of PLMS committee activities to a new one of building links and alliances between PLMS and the RTSD and ALA communities. The creation of a new committee for Program Management reflects the fact that preservation does not consist simply of such discrete activities as binding, repair, and education, but entails management of a complex library problem.

The reorganization of PLMS reflects a growing sophistication in the preservation field as a whole. Less visible is the fact that the profession's knowledge of specific areas of preservation such as disaster preparedness, book repair, and microfilming matured significantly in the past ten years and seems now to have reached a new plateau. That maturation can be seen especially as one examines emerging views toward disaster preparedness, views that increasingly focus on improved strategies for management.

Early Developments. The 1966 flood of the Arno River and consequent devastation of cultural institutions in Florence, Italy, is commonly credited with stimulating the library profession's awareness that disaster preparedness is an important activity. Conservators, librarians, and curators from all over the world converged on Florence to help pull priceless documents and art works from the mud and begin salvaging them. The participants in this massive effort realized that little was known about how to cope with such damage, but many important recovery techniques were developed or refined in that project. The second major result of the Florence flood was the vivid realization that all cultural institutions are vulnerable to such disasters, and that most are unprepared to deal with them. Soon thereafter, the enormity of the problem was brought closer to American librarians with the fires at Temple University's Klein Law Library (1972) and the Military Records Center (1973) and the 1972 floods in the Northeast following Hurricane Agnes.

Veterans of disasters quickly began using their experiences to teach and write on the subject. This publishing output created many works now considered classics in the field of disaster preparedness, including Peter Waters' *Procedures for Salvage of Water Damaged Library Materials* (1st ed., 1975) and John Martin's *The Corning Flood: Museum Under Water* in 1977. These works, like most of those written in the 1970s and early '80s, focused on articulating sound, practical procedures for salvaging wet materials from libraries, archives, and museums.

Elements of Disaster Preparedness. Over

the course of the past 20 years, consensus has emerged on most facets of this field. Disaster preparedness is the comprehensive term that describes strategies employed to protect library resources from unexpected or accidental loss from external causes, whether these be minor (as those resulting from broken plumbing) or cataclysmic (flooding, fire, and the like). Disaster preparedness includes three facets: protection, recovery, and planning.[1]

Protection involves activities taken to prevent or minimize damage to collections. It requires, first, that a library assess its vulnerability to such natural disasters as floods, earthquakes, and hurricanes, and to other incidents such as roof leaks, plumbing malfunctions, fire, and mold outbreaks. Second, it necessitates taking steps to prevent or to reduce the impact of disasters. Such protection takes a variety of forms: installing fire detectors and sprinkler systems, bracing shelves to resist earthquake damage, regularly maintaining plumbing and drainage systems, and storing collections in areas unlikely to sustain water damage from floods, roof leaks, or broken windows.

Recovery begins only after a disaster has occurred and involves three stages: response, salvage, and rehabilitation. In the response stage, the staff organizes the recovery project by notifying necessary personnel, procuring supplies and services for recovery, stabilizing the building's environment, and assessing the damage. The salvage stage involves packing and removing materials from the affected site, stabilizing them (most often through freezing), and drying them by any of a variety of processes (including air-drying, dehumidification, and vacuum thermal- or freeze-drying). The rehabilitation stage for books and documents may include such steps as cleaning, fumigation, repair, rebinding, affixing new labels and plates, reshelving, rehousing archival materials, and deodorization and removal of smoke or soot from fire-damaged materials. Rehabilitation of non-paper materials such as photographic and magnetic media often involves reprocessing and/or copying the salvaged item onto a new, stable medium.

The third element of disaster preparedness—and one that overarches protection and recovery—is the most critical: *planning*. In this activity, discrete lists of facts, resources, procedures, priorities, and options are brought together to form a coherent working document that will guide library policy and staff action on a day-to-day basis and in a disaster situation. The disaster plan should include such informational components as floor plans, lists of suppliers and other resources, personnel directories, insurance and accounting instructions, and various checklists. Perhaps more importantly, it should serve as a guide for the staff in recovering from disasters of various scopes, and it should include instructions and procedures that will be relevant in various scenarios. That is, it should reflect in some detail the library's plans for coping with incidents ranging from small water leaks to mold outbreaks to devastating fire or flood.

Current Situation. Certain activities that comprise disaster preparedness have been exceedingly well documented. Many excellent publications are available to help librarians implement a disaster preparedness project, and many organizations and institutions are willing to share their resource lists and information sheets with their colleagues.[2] For the most part, however, available resources focus on protection and recovery; they lack detailed guidance on planning.

Over the course of some 20 years, the library profession has generated a vast array of content-oriented information on disaster preparedness. Luckily, most disasters have increased librarians' knowledge of recovery procedures,and an increasing number of commercial firms that offer recovery services have emerged. Librarians' knowledge has also increased through the many articles, books, and workshops that offer sound, detailed advice on what to include in vulnerability assessments, the pros and cons of various sprinkler systems, and detailed procedures for drying wet books. Preservation specialists clearly have been guided by the belief that this information would make it simple for institutions to develop disaster plans.

Such content-oriented resources have almost succeeded in developing a "cookbook" approach to protection and recovery. However, most emphasize the *content* of disaster preparedness, but do not adequately address the *process* by which a coherent whole is formed. Thus, even after a librarian has filled in all the blanks in the useful workbooks that attempt to systematize the disaster preparedness process, the result is a compendium of solid information, but not actually a plan. Disaster planning can no more be reduced to a "recipe" than can automation planning. In each case, experts can offer guidance on technical matters; they can outline options and discuss their merits; they can suggest issues to be addressed; they can describe how others have addressed them, but they cannot develop a modus operandi. In the final analysis, each library must develop its own plan.

In the past two decades, the profession's

understanding of disaster preparedness has grown significantly, and a consensus has emerged about what constitutes disaster preparedness and the critical role of planning. Many excellent resources are available. And there is a growing awareness (spurred most recently by the fires at the Los Angeles Central Library and the Leningrad Library) that libraries must have disaster plans. Yet, many libraries still have not developed a disaster plan, and too few existing plans are workable documents that are well incorporated into the institution's operations. Few go beyond the stage of list-compilation.

Recognizing these problems, PLMS members, during the 1987 ALA Midwinter Meeting, proposed an intensive conference on disaster preparedness. The proposal was approved by RTSD; the PLMS planning committee was formed;[3] and on July 8, 1988, RTSD held a preconference on "Management Strategies for Disaster Preparedness."[4]

The program title, like its content, reflected the planners' awareness that what was lacking in disaster preparedness was attention to the *management* of the process.

Emerging Management Strategies. It is evident that further thought and work must be concentrated on disaster preparedness. Preservation librarians, especially those involved in teaching and writing, must develop or adapt better ways for managing the planning process and for incorporating disaster preparedness into the daily work of a library. The profession has begun to explore more effective management strategies for developing and implementing disaster preparedness. Some of the more promising strategies are: (1) more broad-based participation in the planning process, (2) greater integration of disaster preparedness into other library operations, (3) adoption of a phased implementation strategy, and (4) more effective use of cooperative opportunities. Discussion of these four prospects forms the core of this article.

Participation. As preservation specialists analyze the obstacles to disaster preparedness, it is becoming clear that the "Lone Ranger" approach to disaster planning seldom works. Early preservation programs frequently developed in libraries due to the impetus and energy (if not outright nagging) of one dedicated, motivated individual on the staff. Typically, this person became committed to the goal of preservation, became knowledgeable about the field, and began advocating and/or implementing changes in library operations.

Similarly, many disaster plans have evolved from one individual's growing awareness that libraries are vulnerable to (or are frequently experiencing) disasters of various types—the dramatic hurricane or the more common roof leak. While many such disaster plans exist on paper, few have an impact on the regular operation of libraries. Stipulated schedules for roof inspections are not followed; in-house recovery supply stockpiles are not maintained; insurance policies are not updated, and fire safety recommendations are not implemented.

The basic failure of disaster plans developed by "Lone Rangers" arises primarily from lack of participation. Because other staff members are not given an opportunity to develop a sense of "ownership" toward the disaster preparedness effort, they develop no sense of responsibility for its success.

As long as disaster preparedness seemed simply to require training a few people in how to air-dry damp books, it "may" have seemed simple for libraries to permit one individual to develop procedures. However, in the wake of recent disasters and the concomitant maturation of the field, it has become evident that an effective disaster plan must reflect hard choices. Many of the questions to consider cut to the heart of library priorities and staff allegiances: Which will we save first, the reference books or the special collections? Who will have final authority for directing the recovery project, the director or the local preservation librarian? Should our capital budget proposal include a new sprinkler system or an online catalog?

Such questions are difficult to answer, and they require broad-based input from the library staff. If the plan is to work, such questions must be faced directly, and voices on all sides must be heard. The dialogue must include administrative, professional, and support staff; and the perspectives of bibliographers and reference staff, catalogers, circulation and loan services personnel, media specialists, and other technical and public services departments must be sought. Each staff member has a unique perspective on the collection and its users; each will play a valuable role in disaster preparedness.

Others beyond the walls of the library must help shape the disaster preparedness program. Depending on the library's governance structure and other alliances or dependencies, input from the university, county, and community may be needed. Very often these institutions have disaster plans or resources that can be shared. The library's plan must be compatible with that of relevant organizations. For example, a university library's disaster plans must be coordinated with that of the parent institution, and a public library may need to incorporate

existing provisions in a county-wide disaster plan. The staff must know whether the library already has been mandated with disaster preparedness responsibilities as is the case with some state library agencies. And the library must discover how it may draw upon existing networks such as the state emergency management agency or local civil defense. Contacts made during this process will ensure the compatibility of the library's plans with existing ones and will often strengthen ties to the larger community.

Only through seeking broad-based input and discussion (even heated debate) will the final product be a disaster plan that the staff and community will support. And only then will the plan be a workable document that does not gather dust in the files.

Integration. Just as the "Lone Ranger" approach must give way to a more participative process, disaster preparedness activities also must be integrated with ongoing library operations. In the early days of disaster preparedness (as of preservation in general), specialists set themselves apart, declaring the importance and uniqueness of their activities. While that philosophy was important during the establishment phase of this field, it has now become counterproductive. Effective disaster preparedness must be viewed as only one component of a library's overall planning and activities. Preservation librarians have a much better chance of building alliances with others and of accomplishing their mutual goals by becoming partners in the coalition for the good of the library.

One example of the integrative approach is the coordination of collection development or assessment activities and the establishment of salvage priorities. Disaster specialists have long urged librarians to set salvage priorities—that is, to identify those parts of the collection that must be given primary, secondary, and tertiary attention during recovery from a disaster. However, few librarians have actually set such priorities. Planning for salvage tends often to be avoided, even in libraries that have a fledgling disaster plan. Resistance to articulating salvage priorities can be reduced by integrating this activity into an overall collection management plan. It may be useful, while conducting a collection assessment or developing a collection development policy, to query: What parts of the collection are most important in the long term and which are most crucial to our daily operations? Discussion of these issues can bring collection development priorities into sharper focus and can establish the library's salvage priorities. Of course, the final decision about whether a particular library will give first priority to the collections with immediate value or to those with long-term research significance will depend on local circumstances and needs.

Space planning provides another opportunity to integrate disaster preparedness into more traditional activities. When a library plans new construction, renovation, or rearrangement of existing space, disaster preparedness merits consideration. For example, significant collections can be moved from basements and away from windows to reduce their vulnerability to flooding or hurricane. When acquiring new shelving, libraries can procure units with a canopy and with lowest shelves four inches off the floor—thus affording some protection from water. To reduce the risk of arson, book returns that open into the library can be enclosed or replaced with free-standing units away from the building.

There are other simple ways of integrating disaster preparedness into the library's day-to-day activities. Various ongoing prevention measures can prevent disasters or minimize their effects. For example, staff responsible for closing the building can check to see that all windows and doors are closed and securely locked. Workers in acquisitions and cataloging departments can routinely put such important records as on-order and in-process files in cabinets at the end of the day, rather than leaving them on desktops where they are more vulnerable to water, fire, and smoke damage. Step stools in stack areas can be marked with phosphorescent tape so that they will be visible in a darkened or smoke-filled building. Individually, none of these strategies are particularly difficult to implement, and together they can be important building blocks in the library's disaster preparedness program.

Phased Implementation. Integration, a building-block approach, suggests the third management strategy for disaster preparedness. For too long, many librarians have felt that no disaster preparedness activity could begin until the entire disaster plan had been completed. Others who have learned how far-reaching and complex the subject is have, despite their good intentions, simply left it undone. Both attitudes fail to recognize the benefits of "phased disaster preparedness." Librarians must begin to acknowledge that any single step taken to protect the collection from disaster is a valid achievement toward the goal of disaster preparedness. Planners need to segment the job into manageable tasks, phasing in each step over time as the staff gains more knowledge and commitment.

Employing a phased disaster preparedness strategy one library may begin by implementing such protective measures as

regular roof inspections and preventive maintenance or by shifting collections so that lower shelves are not used. This may be especially prudent in a library that regularly experiences roof leaks, flooding, or similar incidents. Alternatively, the same institution might initiate its disaster preparedness effort simply by developing resource lists of suppliers, services, and sources that may be called upon when the collection sustains damage. Another library might begin by identifying salvage priorities. Eventually, such discrete steps will build toward a coherent disaster preparedness plan. In the meantime, these individual actions will have begun educating the staff, developing an organization-wide sensitivity to disaster preparedness issues, and cultivating a belief that progress can be achieved.

To ensure successful implementation, a few preservation librarians suggest that a disaster plan including strategies for protection and recovery must not only be created, but that a strategy for implementing the disaster schemes must be articulated. One of the chief problems in disaster preparedness is that too many written disaster plans are never incorporated into the institution's real goals, plans, and operations. In this context, budgeting, formal designation of staff responsibility, and ongoing staff training and support must be dealt with. In preparing a disaster plan, staff must frequently ask, How will this be achieved so that the plan will be a feasible one for the library? Whether written or existing primarily in the minds of the planners, a strategy must be articulated for ensuring that the disaster preparedness plan is actually implemented and receives ongoing attention.

Librarians are often dismayed to discover the challenges inherent in implementing a disaster preparedness plan, and the preservation field itself is partly responsible for the existing inertia. Practitioners have sought to promote disaster preparedness (and preservation in general) by talking about its importance and its benefits, but they have not acknowledged on the attendant difficulties or costs. Because obstacles have been unseen or dismissed in the planning stages, staff becomes disheartened when their disaster plan is not met with instant acceptance. By acknowledging and identifying difficulties in the early stages, planners can increase the staff's eventual acceptance of the disaster preparedness effort.

In developing a successful implementation plan, staff must recognize that disaster preparedness is difficult, because all organizational change is difficult. Some aspects of disaster preparedness will challenge such long-standing attitudes as "we'll never experience a flood," and such ingrained habits as leaving fire doors open or smoking in the building. Specific plans must be laid to motivate and educate the staff so that they will embrace changes that accompany authentic disaster preparedness.

Cooperation. Another management strategy for disaster preparedness is cooperative involvement. For several years, many writers and speakers have discussed the benefits of cooperation, but few real examples yet exist. Most purported cooperatives actually consist of a few individuals who are willing to make their services available to other institutions when they suffer disasters. While these important services meet a real need, they are more "benevolent parasitism" than cooperation.

More can be accomplished in truly cooperative disaster preparedness, and a few groups are beginning to realize benefits. A consortium of six small libraries, none of which had particular expertise in disaster preparedness, jointly retained a consultant to assess their individual vulnerabilities and to identify areas of common concern among the consortium members. Based on this consultation, staff members of the libraries drew up a "model" disaster plan that could be adapted by each, and the libraries are now exploring the potential of developing a common stockpile of recovery supplies. Other groups have concentrated efforts on training staff members locally so that each is prepared to develop and execute a disaster plan either in his/her own institution or in concert with others. Still other consortia have shared the work of identifying services and suppliers. Most successful projects have been marked by the willingness of each participating library to shoulder its share of the responsibility for becoming educated and of acting upon that knowledge. In these cases, the cooperative effort has increased the overall knowledge level of the staffs involved and has reduced the time that individual participants must devote to gathering basic information.

An additional, little acknowledged benefit of cooperative disaster planning is the maintenance of momentum. For a single library acting alone it is all too easy to let disaster preparedness activities slip to one side. However, if several institutions are working together, they often motivate or goad one another to continue the activity; for if deadlines for action are set, each participant will feel pressure to deliver on his/her commitment.

Cooperation in disaster preparedness, especially at local and state levels, is increasing. As librarians seek greater participation from their own staff, and then turn to the

surrounding community or network, it is not surprising that common needs are identified and cooperative solutions begin to emerge. This bodes well for the field: the number and quality of successful disaster preparedness activities will increase.

Conclusion. The 1988 RTSD preconference, "Management Strategies for Disaster Preparedness," stands as a benchmark in the development of the field. It reflected the recognition that disaster preparedness—like the whole arena of preservation—must rest upon an overall management approach and must be well incorporated into a library's ongoing operations. It sought to communicate that recognition to a national audience.

However, while the conference was designed to accept more than 100 attendees, only about 40 registered, confirming the notion that most librarians still focus on the content- or information-oriented aspect of disaster preparedness, and not on the planning process. Thus, many librarians are not aware of the management issues whose significance is now emerging in preservation. Also highlighted is the fact that more library administrators must accept disaster preparedness as a serious professional responsibility. The willingness of administrators and other professionals to undertake this responsibility may grow as they recognize that libraries can improve disaster preparedness significantly without creating massive new programs. Even with limited personnel and financial resources, application of the management strategies outlined in this paper and at the preconference can accomplish much.

NOTES

1. At the outset, it should be acknowledged thet there is some blurring of the distinction between the terms "disaster planning" and "disaster preparedness." This is true because disaster planning should incorporate the whole gamut of disaster preparedness activities, and the sum of the disaster preparedness activities are reflected in the written disaster plan. While no strict distinction has emerged, disaster preparedness is the term used here to encompass all other disaster-related activities.
2. Some of the more useful longer publications dealing with these topics are John P. Barton and Johanna G. Wellheiser, eds., *An Ounce of Prevention*, Toronto, Toronto Area Archivists Group Education Foundation, 1985; John Morris, *Managing the Library Fire Risk*, 2d ed. Berkeley, University of California, 1979; New York University Libraries Preservation Committee, *Disaster Plan Workbook*, New York, NYU Libraries, 1984; Peter Waters, *Procedures for Salvage of Water Damaged Library Materials*, 3d ed. at press, Washington, D.C., Government Printing Office, 1989.
   In addition, a wide variety of informational leaflets, resource lists, and other sources of guidance are available from such organizations as the Illinois State Library Preservation Office, Los Angeles Preservation Network, New York State Library Conservation/Preservation Program, Northeast Document Conservation Center, and SOLINET Preservation Program.
3. Planning committee members were: Merrily Smith (Library of Congress), Chair; Sally Buchanan (University of Pittsburgh), Christopher Coleman, (University of California at Los Angeles), Nancy Elkington, (University of Michigan), and Lisa Fox, (Southeastern Library Network/SOLINET). I am indebted to these individuals who served, along with Connie Brooks (now at Stanford University), as the faculty for the preconference. Our discussions prompted much of my thought on this subject.

Outline for a Flood Preparedness Exercise

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1. Introduction

1.1. Water

Water itself is not inherently damaging to paper; in fact, washing paper is a common conservation treatment. The problems in a flood arise because a book is not simply paper, but is a complex composite object, composed of varying materials that react differently to water. These materials swell, curl, stretch or shrink, at different rates and to different degrees. A system that, under normal circumstances, functions as an integral machine, becomes, when wet, a network of conflicting forces, pushing and pulling against one another until one component or the other gives way.

Dry Paper has a normal water content equal to 5 - 7% of its weight. However, the water content can increase to as much as 30% and the paper still feel reasonably dry to the touch. Therefore, it can be very misleading to base your actions on whether something 'feels dry'.

In theory early papers (before the mid-nineteenth century, when modern sizing techniques came into force) are capable of retaining up to 80% of their weight in water and modern papers up to 60%. In practice the retention rates seem to be substantially higher, perhaps because a great deal of water can be retained on the surfaces between the pages.

1.2. Materials

Many books, especially art books and books with photographs, are printed on coated paper stock. These papers have a surface layer of an adhesive material and one of several pigments or powdery substances, such as Kaolin (china clay). When a textblock printed on such paper gets wet, the adhesive softens and the coatings on adjacent leaves bond together. When this effect, which is known as 'blocking' occurs, it is virtually impossible to reverse. If the textblock is promptly frozen at very cold temperatures (which promotes the formation of smaller ice crystals) and then vacuum freeze dried, sometimes blocking can be prevented. Under no circumstances should coated stock books be allowed to dry; if freezing must be postponed and the paper is wet (i.e. not merely damp), it is better to leave the book under water. However, in such cases the chances for successful recovery are severely reduced.

It is sometimes recommended that items with coated stock be interleaved with waxed paper out of concern that the tacky paper surface might stick to to the surface of ordinary paper towels or newsprint. However, waxed paper is hygrophobic and will not serve as a "wick" to draw moisture out of the book, and is therefore not as effective. In practice, this secondary adhesion does not usually occur.

Even if only a small quantity of material is involved it is rarely advisable to attempt to air-dry books with coated stock unless the pages are not at all blocked. While it may be possible to separate the pages and interleave them, it is necessary that the interleaving sheets be placed between every leaf in order to prevent the leaves re-blocking. This creates a drastically swollen textblock and will result in severe damage to the sewing and binding. If this technique is used, it will almost always be necessary to rebind the volume. In addition, because even when performed with care this technique entails serious risk of tearing the paper or disrupting the paper surface or the image, freezing and vacuum freeze drying is preferred.

Leather, when wet will shrink severely and often undergo extreme darkening. Both of these effects ought to be considered irreversible.

Book cloth is fairly stable when wet. It neither expands nor shrinks dramatically. Because other components of the book, such as the boards, do expand when wet, this stability can result in board warpage. Dyes in many book cloths will run, and can permanently stain other materials with which they come in contact. Many cloths are sized with starch which will dissolve and form a slimy mess, that in addition to being rather unpleasant to work with, provides a good medium for mold growth.

Sewing thread may be dimensionally stable, or may stretch. More often, however, it will shrink slightly. Coupled with the swelling of the textblock paper, this encourages the development of a concave spine. For those who care about such things, the tendency of the thread to shrink or stretch is a function of its twist structure.

1.3. General considerations

1.3.1. Mold

The principal enemy is mold, which can set in quickly if conditions are favourable, as they frequently are at a flood site. Although this is a somewhat inadequate characterization, it is a common and reasonable rule of thumb that mold may establish itself within 48 hours in a warm, damp environment. It is important to remember that if conditions are more severe, mold can develop within a shorter period; nevertheless, if the material is dealt with within that period and if the ambient conditions are brought quickly under control, the likelihood of a successful recovery is good.

1.3.2. Severity of floods

Floods may reasonably, if arbitrarily, categorized according to a three-step scale of severity. Their assignment with respect to this scale will to a great degree determine the nature and extent of intervention.

1.3.2.1. Minor Emergency

In this category, there are few enough items that it is practical to air-dry them on-site immediately. In some cases we may choose to freeze some or all of the items in the Preservation

Department's blast freezer. Within our institution, the category "Minor" is generally applied to emergencies involving less than 100 items but for some types of materials, it may be possible to deal with more (or fewer) items.I n practice, moreover, many of the materials affected are likely not to be very wet, but merely damp.

Minor Emergencies are handled by the Preservation Department staff. The Collections Emergency Response Team is not called and assistance from outside the institution is not requested.

1.3.2.2. Moderate Emergency

This category applies to emergencies in which as many as 4000 items are affected. In such instances, we are likely to need outside resources, such as large freezers, etc. An event in this category may invoke a pre-planned organizational response, such as calling upon the Collections Emergency Response Team or implementing a phone tree.

1.3.2.3. Major Emergency

Generally, if more than 4000 items are involved, and damage is severe, than the event is assigned this classification. All available resources, both within and outside the institution, are called upon.

1.3.3. Damage Assessment and Intervention Priorities

In any flood, but especially in a large scale flood, damage and loss is inevitable. Some material will be permanently disfigured, whether cosmetically or structurally. The object of a salvage effort is to recover the collection as a whole, while minimizing damage. Under emergency conditions there is sometimes a tendency either to spend too much attention on single items or small groups of items at the expense of the collection or, on the other hand, to become somewhat callous to the damage being caused by, say, handling or packing. Both extremes are to be avoided but the former is probably the more dangerous.

Items of the highest priority (greatest value, greatest significance to the collections) should be removed from the flood site, as should the wettest items. An adequate disaster plan will have identified such materials ahead of time

Some materials are so vulnerable to water damage that they must be given immediate attention or they will be irrecoverable. In the event that collodion wet plate negatives, ambrotypes, pannotypes, or tintypes become wet, they must receive immediate attention.

Wet coated paper stock should be frozen before the paper dries. This paper is very susceptible to blocking and once blocked is virtually impossible to separate. Vacuum freeze-drying is the most effective way to avoid blocking.

1.3.3.1. Assessing the wetness of the material

The wettest items are not only likely to be the ones most in need of attention, but, since they hold substantial quantities of water, their removal will help a great deal to lower the ambient humidity at the flood site.

Visual clues are good indicators of water content.

Swelling, cockling (undulation of sheets), darkened colour of paper or cloth and deformation of binding all indicate absorption. The longer the books have been exposed to water, the more pronounced these indicators will be.

Swelling, especially, is an indicator of length of exposure. As the book sits in water, it continues to absorb water and the various parts swell at different rates. The textblock will swell the most and push out against the less expansive case and the sewing thread, which may even shrink. This results in a tendency for the spine to assume a concave configuration and the longer the book sits the more concave it becomes.

Some books, when they have been sitting in a pool of water for a few days swell to such an extent that the spine forms a tight backwards circle and the front board actually comes around to touch the rear board. Some tightly shelved books may swell to such a degree that they 'walk' themselves off the shelves. In most cases the swelling will reach a maximum after a few days.

If mold has already developed, there is little likelihood that the material can be air dried, and it should normally be frozen immediately.

Either the uppermost or lowermost shelves will be the wettest, depending on the source of the water.

1.3.4. Immediate action (all levels of damage)

Eliminate the source of water.

Turn off the heat. If possible turn air conditioning on and leave it on around the clock. Turn on fans and dehumidifiers. The aim is to keep the air as cold and dry as possible and to keep it moving. This will discourage the development of mold.

Vacuum out (with wet-dry vacuums) any standing water. If there are carpets or curtains that are holding water, they may need to be removed.

Be aware of potential electrical hazards. It is often necessary to turn off the main power and run the fans from generators to avoid fire or danger to personnel.

2. Books and Paper

2.1. General handling

The paper will have very little wet strength and is subject to tearing. Although this sounds rather obvious, the degree of weakness comes as quite a surprise to many people at their first flood.

Do not attempt to open a fully wet book. The pages of a wet book cling together quite aggressively and an attempt to open it often results in serious tears. Moreover damage to the binding can also occur. There are exceptions to this rule. If the book is only damp, it is usually safe to open it, though it is rarely necessary unless it is to be air dried.

In most situations, it is also unwise to close a wet book that has been lying open, as often happens when books 'walk' off the shelves and fall into standing water. Such books are usually badly swollen and the pages are temporarily fused together. If you observe the motion of the pages as you open a dry book, you will notice that the pages slide easily over one another. When paper is wet, it loses this slipperiness and clings to adjacent sheets. If you close a book in this condition, severe distortion and tearing can result. There are rare exceptions to this rule.

2.1.1. Mud, silt, dirt, etc.

As a general rule it is advisable not to attempt to remove such accretions at the flood site, but rather to allow them to dry and brush them off later. However, if the materials are extremely dirty or if the nature of the contaminants is particularly noxious or toxic, as, for example, sewage, it may be necessary to wash off at least the covers of the book before further treatment. The book is held gently closed and a slow stream of water run over the spine, with the fore edge pointed down so that the water runs off the case without further wetting the paper. On occasion it may be necessary to wash contaminants from the paper itself, in which case extreme care should be taken and the task should be performed as quickly as possible. Books that have been so washed, should normally be frozen immediately and dried very carefully after the emergency has passed. Rare materials, art on paper, and other unusual materials may need to be treated in a different fashion; these are not dealt with here.

2.1.2. Disbinding

In a small-scale emergency when attention can be paid to individual items, it is, on occasion, appropriate to remove the textblock from its case (by slitting through the hinging material). This may be appropriate when the textblock is swelling severely and is being distorted by the less expansive case, or when mold has begun to grow in the case. In a large scale emergency, such action is rarely warranted.

22. Minor Emergency

221. Air Drying

Despite its apparent simplicity, air-drying is a surprisingly time consuming, labour-intensive operation. Even a relatively small group of materials can demand continued attention for days or weeks after the initial drying period. If materials can be replaced or discarded, it is often wise to take advantage of this.

A site must be found for air-drying, removed from the flooded area and available for several days. Normally books are stored very compactly, packed densely on upright shelves. In order to air-dry them they must be spread out relatively sparsely over horizontal surfaces. Thus a drying area must be many times larger than the original storage area.

The work area must remain as dry as possible. It should be kept free of wet debris.

2.2.1.1. Supplies

Large tables or, if necessary, large areas of floor are essential.

White, unprinted paper towels are needed for interleaving. Generic are best, because you will need a lot. Clean, unprinted newsprint can be used as a substitute.

Towels or blotting paper are used to line the tables and to remove water that drains from the materials.

You will need a sufficient number of fans to keep air moving in every part of the work area. Large industrial floor fans are best, but ordinary floor, window, and circulating fans are adequate.

Line the table with towels, paper towels or blotting paper. These will absorb water dripping from the books and prevent their sitting in standing pools.

2.2.1.2. Procedures

Place a sheet of paper towel between the leaves every 20 leaves or so. The paper should not be placed all the way into the fold, because this will lead to a buildup at the spine, which will cause the case to fail. If the book is to be set on its tail (normal shelving position) arrange the interleaving such that it extends past the edges of the book at the fore edge and the head edge but not at the tail edge. This will provide an exposed area of interleaving paper while still allowing the book to stand safely. This interleaving paper serves as wick to draw water out of the book. Water will evaporate at the exposed edges of the interleaving, and, as it does so, water from the interior of the book will move, by capillary action through the interleaving toward the exposed edges.

The boards of each book should be fanned open and and the volume stood upright on the table. Often it is possible to place the books in such a position that they help to prop each other up. Frequently either the tail or the head of the book has absorbed more water (depending upon the source of the water). If so, turn the book so that the least weight is placed on the swollen area.

Place fans such that they keep air moving gently overall of the volumes without blowing them over. Sometimes this can be best accomplished by using large powerful fans and placing them at a considerable distance from the table. The fans must be left on around the clock until the drying is complete. If possible, air conditioning should also be left on continually.

As the interleaving papers become saturated with water, replace them with fresh interleaving. Try to place them between different pages than you did the last time. That is if the first interleaving was between pages [20-21, 40-41, 60-61 ...], the second should be between [30-31, 50-51, 70-71 ...], the third between [25-26, 45-46, 65-66 ...] and so forth. When the books are very wet, the interleaving will become saturated almost immediately and as soon as you finish interleaving a small group of books, it will be time to start all over again.

As the drying progresses, a stage will be reached at which the interleaving papers cease to wet out but merely become damp. At this stage, it is no longer necessary to replace the interleaving.

After the books feel dry to the touch, a condition that may take several days if the books were quite wet, remove the interleaving papers and leave the books fanned open, with the fans still running continually for several days. Paper can hold substantial quantities of water and still feel dry to the touch.

Line Drying. Used as either an alternative or a supplement to interleaving and air-drying, this process, in which the *partially dried*volume is suspended from thin monofilament lines, line drying can help to avoid spine distortion caused by extreme swelling or excessive interleaving. The lines, no longer than about 6 feet, are strung 1/2 inch apart between two walls, tables, etc.

This process is only rarely necessary and is not appropriate for heavy or saturated volumes. There should be sufficient lines (three or more) to maintain the proper shape of the spine.

Small, light v-shaped items, such as saddle-stitched pamphlets and journals can be line dried on single lines, if the inner margins are not so wet that the line will cut through the weakened paper.

2.2.2. Freezing onsite

See Major Emergency -- Freezing, below

2.3. Moderate Emergency

Events in this category usually involve some combination of actions associated with both minor and major emergencies. In many ways, these are the most difficult sorts of emergencies to deal with.

2.4. Major Emergency

In the case of a large scale flood, one in which so many items have been affected that it is not possible to dry them on-site, the objective is to freeze the materials as quickly and safely as possible. Again, the principle enemy is mold, and the (somewhat misleading) limit of 48 hours applies (See General Considerations -- Mold, above). Proper freezing at very low temperatures, as in a large commercial food locker, will stabilize the objects, preventing the development of mold, the further swelling of the paper and boards, the bleeding of inks and, if we are lucky, the blocking of pages. More importantly, however, freezing buys us time. Because the books can remain frozen indefinitely without danger (for years, if necessary), we gain the leisure to plan the salvage effort sensibly, without having to operate under crisis conditions. In a major flood, recovery will almost certainly involve vacuum freeze drying and a aggressive program of rebinding and repair, both of which impose significant logistical difficulties.

2.4.1. Books

Packing books for freezing.

If milk crates are used, they can be stacked higher than cartons. However, as wet books are very heavy even milk crates should usually not be stacked more than three high. In one flood here, a pallet loaded with milk crates three high was so heavy that a forklift couldn't lift it.

Each volume should be very simply wrapped in freezer wrap. This prevents the volumes from sticking together and facilitates unpacking and rearrangement or manipulation inside the freezer and vacuum chamber. A piece of freezer wrap is rough-cut to approximate size and simply folded in a U-shape around the case. An assembly line should be set up atthe flood site. Cutting freezer wrap from the roll (Zippy (tm) cutters are great for this), assembling cartons, and wrapping and packing the volumes are operations that need to be done as efficiently as possible.

Whenever possible, books should be packed in a single row with the spine down. If that is not possible, then they may be packed flat. In this case it is important that a large book never be placed on top of a smaller one, because the larger one will sag and become permanently deformed. It is important never to box wet books in a normal standing position or with the fore edge down because the weight of the wet paper will pull the textblock out of the case. Similarly, with books boxed spine down, one should never try to save box space by adding a second row of books; the second row will crush the bottom row, resulting in permanently misshapen volumes.

Books will tend to take on permanently their shape at time of freezing. One can think of the book as a malleable material, like wet clay; a little care and common sense in molding and packing will go a long way toward recovery. On the other hand, because wet paper has very little strength and because the wet sheets do not slide against one another but cling to each other, an excessive attempt to bend or mold the volume may cause great damage and result in a volume that is neither usable nor repairable.

Books packed for local freezing in a Wei To (tm) blast freezer can be handled in largely the same manner as books sent to a larger food locker, although it is usually more efficient not to box the books but simply to lay them flat in small piles. Again, common sense must be the principal guide.

It is possible to dry books in the freezer and if this is envisioned it may be best to leave the material unboxed. Although it is possible to dry books inside cartons, leaving the materials unboxed allows freer air movement resulting in quicker, more efficient drying. In many cases it will be desirable to insert a sheet of non-woven polyester web between the boards and the textblock to facilitate the movement of water vapour from the book to the air. If the books are very wet or are of leather, there is a danger of impressing the image of the freezer's wire racks into the covering material. Often this can be prevented by placing the most vulnerable books on the top of the pile or by placing the volume on a small stack of non-woven polyester web.

Books that have been swollen open should not be closed. Instead they should be packed in their own carton. Similarly, books that have stuck together should not be separated, but wrapped as a unit and packed together

2.4.1.1. Supplies

Books can be packed either in cardboard cartons or milk crates. Milk crates , being rigid, offer more support than cardboard cartons do and they allow drainage. However, in a vacuum freeze-drying chamber they provide less even heat distribution than cardboard cartons.

Milk cartons can impress their grid patterns in wet materials. It is sometimes wise to insert a sheet of heavy cardboard in the bottom of the carton to isolate the materials from the grid.

2.4.1.2. Procedures

2.4.2. Flat Paper

Flat materials, such as manuscripts, typescripts, prints, drawings, blueprints, photocopies, etc. exhibit somewhat wider variability of materials and production methods than printed books. As a result problems with soluble media(bleeding inks, etc.) and blocking of paper are common. Inks may dissolve and offset onto adjacent materials. Such staining will frequently be permanent and irreversible

In most instances, it will be desirable to freeze the material and dry it sometime in the future. Improper drying or uneven drying may result in additional damage In general the material should be frozen in stacks. Cartons of manuscripts in file folders can be frozen in the cartons without further preparation. At this institution, it will often be possible to freeze and freeze-dry up to 9 cartons of flat material on site, in the Preservation Department blast freezer.

If it is not going to interfere with the rest of the salvage effort, it is advisable to keep labels, folders, etc. with the objects, but frequently this is unwise. Time and efficiency take precedence under emergency conditions.

In some instances, as when it is not possible to freeze the materials, it may be necessary to separate the sheets of paper from a block of wet material. The material can then be air-dried or dried between blotters under light weight, and at a later stage, flattened. Either drying method involves a great deal of time and space, both of which are usually in short supply at the flood site.

2.4.2.1. Supplies

Polyester film (mylar (tm)) is used to separate sheets from wet blocks of paper and as a support for wet sheets.

Hollytex(tm), or other non-woven, spun bonded polyester web are used to

Clean, smooth, undyed blotters.

2.4.2.2. Procedure

(The following procedure can potentially cause a great deal of damage and should normally be done under the supervision of a conservator). A team of several workers, working with adequate table space, can separate a blocked stack of sheets quickly.

The polyester film is moistened slightly with a sprayer or sponge and laid on top of the stack. The polyester film will cling to the top sheet. With extreme caution, the film can be rolled back, and with it a small stack of paper (10-20 sheets), which is passed to another worker. In this way the large stack is broken down into smaller more manageable piles and the work of separation can proceed quickly.

Each person then repeats the following process for each sheet in the smaller stack: a moistened sheet of mylar is placed on the top of the stack and a single sheet of paper gently rolled off. The mylar support is placed on the table with the paper up, a sheet of Hollytex is laid on top (this can take a bit of practice) and a blotter pressed gently on the Hollytex to take up any standing water. The whole unit is turned upside down so that the mylar is on top, the mylar very carefully rolled off the paper and a second sheet of Hollytex laid onto the paper and blotted. Removing the mylar is the most difficult and dangerous operation, as the wet paper will have very little strength and will tear easily.

2.4.3. Freezing

It is important to freeze the materials as quickly as possible. Until the items are frozen through to the center, the freezer temperature should be -29 deg. C or lower to encourage the formation of the smallest ice crystals. After this state has been achieved, the freezer temperature can be raised to somewhere below the freezing point, (somewhere in the range -6 deg. c to -2 deg. C), so that some drying can occur in the freezer.

Home freezers are usually not cold enough to achieve rapid freezing, but may be used at the lowest possible temperature setting, if more suitable equipment is not available. Frost-free units are preferred since they will begin to dry the materials, albeit slowly.

3. Non-Print Materials

3.1. Photographic Materials

Photographic materials, whether print or film, must never be allowed to dry in contact with any surface. Once blocked, it may be impossible to unblock without doing irreversible damage to the image.

In general, for print materials, it is best to air-dry immediately. If it is not possible to air-dry all the material immediately, the material may be frozen following the guidelines given above and then air-dried later.

In general, for microfilm and roll films the best approach is to keep the material wet and arrange for professional salvage (e.g. Kodak) immediately.

Vacuum freeze-drying should be used only as a last resort, since it can result in changes in surface qualities. Vacuum drying should never be used.

3.1.1. Salvage Priorities

Collodion wet plate negatives, ambrotypes, pannotypes, and tintypes are so vulnerable to water damage that they must be kept safe from exposure to water. In the event that these materials become wet, they must be dried immediately by a conservator. These materials must not be frozen, vacuum dried, or vacuum freeze-dried.

Prints are generally more vulnerable than film or negatives,colour material more vulnerable than b&w, but all photographic materials are very sensitive and require rapid intervention.

3.1.2. Slides and Negatives

If it is not possible to air-dry them immediately, these materials can be placed in zip-lock bags filled with cold clean water. Ideally, distilled or deionized water should be used. At this institution the preferred water is deionized water water available in the conservation lab. If that is unavailable, bottled drinking water drinking water from the water coolers may be used. Ordinary tap water should only be used as a last resort. The water should be kept as cold as possible. Refrigeration is ideal but if it is unavailable ice (not dry ice) can be added to the packages if cooling is necessary.

If it is necessary to keep gelatin materials submerged for a prolonged time it may be necessary to add formalin to the water (to make a 1% w/w solution). This will harden the gelatin. However,

this step should not be done without instruction from the conservation lab or photographic lab as there is a risk of excessive hardening.

The adhesives in the slide binders will swell and dissolve with prolonged immersion in water. As these adhesives are coloured, they may stain adjacent material. Periodic water changes may be necessary to prevent this.

3.1.2.1. Black and White slides and negatives

In theory these may be kept wet for up to 72 hours, after which time me the emulsion may be expected to lift. If the materials cannot be sent to a suitable photo processing lab (e.g. Kodak) within this time, the materials should be frozen. In practice, we have kept materials wet for longer periods without significant damage.

3.1.2.2. Colour slides and negatives

In theory these may be kept wet for up to 48 hours, after which time the dye layers may begin to dissolve. If the materials cannot be sent to a suitable photo processing lab (e.g. Kodak) within this time, the materials should be frozen. In practice, we have kept materials wet for longer periods without significant damage.

3.1.2.3. Microforms and Motion Picture Film

Roll films wet in a different manner than sheet films and prints. Because they are tightly wound, it is not at all unlikely that the interior of the rolls may not be significantly wet. If they are it is possible that the film is only wet along the edges, near the sprocket holes. However if it is wet, then the softened emulsion may cause the tightly wound film to fuse together. Film cans, microfilm boxes etc. can offer substantial protection against water damage; materials in such containers have been found to be dry even after floating in water for long periods.

Normally these materials should be kept wet and sent to Kodak or a film processing lab as soon as possible. The salvage operation will probably involve reprocessing the film. It is essential that the film not be allowed to dry because it will fuse. Plastic (not metal) garbage cans and buckets filled with clean cold water make appropriate storage containers. Garbage cans with locking lids can be used to transport the materials to the lab.

An effective method of handling microfilm, is to leave the reels in their boxes, fill the boxes with clean water, seal several boxes together into a "brick," and ship them in sealed containers, such as garbage cans lined with plastic garbage bags.

In rare instances, roll film may be dried in-house be rolling it slowly with a pair of film rewinds and cleaning it with film cleaner, a solvent which will encourage even drying. This procedure is too time consuming to consider unless only a very few items are affected.

Microfiche. This is difficult to reprocess. If possible it should be frozen and air-dried. If air-drying is not possible, they may be vacuum freeze dried.

3.1.2.4. Photographic Prints

3.1.2.4.1. Assessment

If negative are available, it may be best to discard the prints and devote your attention to other materials. In some cases, the prints themselves may be of artistic or historic significance. Normally these materials should be kept wet and sent to a photographic conservator, Kodak or a film processing lab as soon as possible. In minor emergencies, if trained staff is available, prints may be dried in house.

3.1.2.4.2. Supplies

High quality, smooth surfaced, acid-free blotters will be needed in quantity. Photographic blotters or laboratory filter paper are excellent materials.

Hollytex, a non-woven, spunbonded polyester web is used because it is inert and has a very smooth surface that is relatively unlikely to impress itself in the soft emulsion.

Formalin, to make up a 1% solution, may be used in some instances.

3.1.2.4.3. Procedure

Air-drying prints is a more involved procedure than air-drying books and should normally be done under the supervision of a conservator.

The most important aim is to ensure that prints do not dry in contact with each other or enclosures, etc. If it is not possible adequately to dry the materials, it is better simply to separate them and spread them out on plastic mesh screens to dry. They will curl severely, but this is less damaging than letting them fuse together. If space is hard to come by, prints can be dried on lines, attaching them to the lines with clips. Obviously, the clips should be restricted to the edge of the pring and must not come in contact with the image area. To minimize the impression of the clip, insert a v-shaped fold of blotter and hollytex (the latter in contact with the print) between the jaws of the clip.

The print should be immersed in distilled or deionized water to remove dirt, accretions, and impurities deposited by the flood water. Standing water is removed with blotters, the print is placed between two sheets of polyester web, placed between blotters, and allowed to dry under very light weight. After a few minutes the blotters must be changed, because they will cockle. The blotters should be changed a second time after another fifteen minutes, and perhaps a fourth time after an hour.

When wet, the film emulsion, which is a hardened gelatin, will become very soft. Any contact with the surface can cause permanent and irreversible marking. If the blotter has any texture, that texture will be transferred to the print surface. The polyester web will prevent the print from adhering to the blotters, but great care must be taken.

3.2. Electronic Storage Media

3.2.1. Floppy Disks

Disks consist of iron oxide bonded to polyester film, housed in plastic sleeves lined with Tyvek(tm). If they get wet and are allowed to remain damp, the rust, which carries the encoded information, may become disturbed (rusty rust). The goal, then is either to achieve fast, even drying or to keep the disks wet until they can be dried properly.

If time is available and the floppies are merely damp, it may be possible to air-dry them with hair dryers set on low temperature. If the disks are wet, muddy, etc. or if treatment must be postponed (e.g. if there are many of them), then they should be kept wet in cold, clean water, in plastic trays, garbage cans, buckets, etc. In the case of significant material, get in touch with any of the major disk manufacturers, several of which can provide salvage services and technical advice.

In some instances, the information on floppies can be recovered. Any salvage work on floppies is going to entail a significant expenditure of time, effort, and perhaps money, so locating backup or replacement copies and discarding all but essential disks is wise.

3.2.1.1. Procedure

The wet floppy is kept wet until treatment. Two edges of the sleeve are slit open, being careful not to cut the disk itself (the disk floats freely within the sleeve and can be pushed to the opposite end of the sleeve).

A blank sleeve is prepared by slicing two edges from the sleeve of a new diskette and discarding the disk itself. The old disk is inserted in the new sleeve, and the information copied to a new disk. After several disks have been copied, the sleeve should be replaced, as debris from the damaged disks may buildup on the Tyvek surface.

If the medium has been damaged, high level copy utilities (such as DOS copy and diskcopy commands) may not work and lower level sector editors may be necessary.

As disks may have information recorded on both sides, it may be advisable to mark the top surface of the disk in a non-information carrying area (e.g. the area at the large round spindle hole at the center of the disk).

An expendable disk drive should be used for this procedure and it should be cleaned frequently.

3.2.2. Videotapes

In most cases, replacement will be the most appropriate action. In very rare instances, it may be possible to dismantle the cassette and dry the tape chemically in a manner similar to the procedure for roll film (see Non-Print Materials -- Photographic Materials -- Microforms and Motion Picture Film). Consultation with a recording engineer is advised.

3.2.3. Videodiscs, Optical discs, etc.

Normally these can be washed in clean water and air dried without problems.

APPENDIX VII

BASIC GUIDELINES FOR DISASTER PLANNING IN OKLAHOMA

OKLAHOMA CONSERVATION CONGRESS

Basic Guidelines for Disaster Planning in Oklahoma

Prepared by
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BASIC GUIDELINES FOR DISASTER PLANNING IN OKLAHOMA

Disasters have not been known to inquire about one's state of readiness before striking. Knowing what (and what not) to do before, during, and after a disaster will prevent panic, lessen the severity of damage, and enable you to implement an organized recovery operation after the dust settles, the smoke dissipates, and the water subsides.

The following guidelines are offered to assist you in the preparation of a disaster plan and the organization of salvage procedures for your own institution. They should be tailored to fit your institution's needs and idiosyncrasies. Members of the in-house recovery team should receive two copies of the plan — one to keep at work and one to keep at home. The plan should be reviewed and updated at least twice a year to reflect changes in personnel, holdings, policies, procedures, and sources of supplies and equipment.

All staff members should read and have access to your disaster plan. Training in disaster recovery techniques should be available to all staff members and mandatory for those individuals serving on your recovery team. This training is available from the Oklahoma Conservation Congress (OCC) and from the Oklahoma Disaster Recovery Assistance Team (O-DRAT). Information concerning these organizations may be obtained from the Archives and Records Division, Oklahoma Department of Libraries (ODL), 200 North East 18th, Oklahoma City, OK, 73105; (405) 521-2502. A copy of the disaster plan should be sent to the Archives and Records Division of ODL to facilitate the work of the members of O-DRAT, in the event their services are requested.

A minimum of five individuals should comprise the in-house disaster recovery team. Each should have an alternate. Their responsibilities should be as follows:

1. Team Leader: Overall management of salvage operation; coordination with administrative offices and media; budget allocation for wages, supplies, transportation, and services; public relations.

2. Assemble and coordinate work crews, control work and materials flow.

3. Record/inventory control of damaged materials.

4. Damage/salvage assessment, coordinate recovery effort, train work crews.

5. Assemble supplies and equipment, provide food for work crews, photograph damage and recovery operation.

DISASTER PREVENTION

Man-made disasters can often be prevented by routine inspections of a facility. Temperature and humidity should, ideally, be maintained at a constant 68° F and 50% RH. Cleaning and spraying for insects and rodents should be performed on a regular basis. Materials should be properly stored and protected from dirt, dust, and light. Ultra-violet filters should be placed over fluorescent lights and on windows. Leaky pipes, frayed electrical wires, unended machinery, open windows, and structural damage can result in unnecessary destruction of materials and possible loss of life. Aisles and work areas should be kept free of unprocessed materials and trash.

Machinery should be unplugged when not in use. Rules regarding food, beverages, smoking, and unauthorized access should be established and enforced. Security checks should be made at closing time to ensure all exits and windows are locked, all equipment has been turned off or unplugged, all lights and water faucets are off, no cigarettes are smoldering in ashtrays or wastebaskets, and no unauthorized personnel are in the building. Consult Barton and Wellheiser, *An Ounce of Prevention: A Handbook on Disaster Contingency Planning for Archives, Libraries and Record Centres* (see page 11 for bibliographic citation) for additional information and instructions.

Disasters do not appear out of nowhere. Be aware of all hazards (situations that have the potential for causing damage) and correct them before they develop into disasters. Staff members should all be familiar with the layout of the building and of possible danger areas. They should know the location of all fire extinguishers and alarms and how to operate them. Fire exits and alternate escape routes should be clearly marked. Evacuation procedures should be established and practiced regularly.

Be aware, too, of hazards that may exist in the community that could affect your facility. If your building has been designated an evacuation center by city officials, determine the chain of command and whether you or the city will be responsible for security.

All sources of supplies and services should be contacted in advance to explain your needs and purpose. Sources should be contacted on a regular basis to determine whether those supplies and services are still available and to remind them of their commitment. Keep in mind that in a wide-scale, major disaster, your sources may not be available because they have their own damages with which to deal or because they are assisting someone else. In addition, outside help probably will not be available for one or two weeks. It is recommended that you keep as many recovery materials as possible on-site.

DISASTER PLAN FORM

I. Name of institution _____

II. Date of completion or update of this form _____

III. Staff members to be called in the event of a disaster:

Position	Name	Telephone Number Home	Office
Chief library administrator			
Individual in charge of building maintenance			
Preservation administrator or conservator			
In-house disaster recovery team members/alternates			

Note below who is to call whom upon the discovery of a disaster ("telephone tree")

IV. Off-site services to be called (if needed) in the event of a disaster

Service	Name of contact	Telephone number
Fire Department		
Police Department		
Ambulance		
Civil Defense		
Insurance company		
Legal advisor		
Utility companies		
Electrician		
Plumber		
Carpenter		
Exterminator		
Chemist		
Mycologist		
Locksmith		
Janitorial service		
Individuals and/or organizations to assist in clean-up		
O-DRAT	Gary Harrington	1-800-522-8116

V. Upkeep Checklist

A. Daily Procedures

Locks on doors and windows secure and all keys accounted for

No pipes, faucets, toilets, or air-conditioning units leaking

Electrical equipment unplugged and no frayed wiring in evidence

No signs of structural damage

No burning materials in ashtrays and wastebaskets

B. Periodic Procedures

	Date checked
Emergency numbers are accurate and posted near every telephone	
Most recent inspection by fire department	
Fire extinguishers operable	
Smoke alarms operable	
Sprinkler system operable	
Water detectors operable	
Halon system operable	
Public address system operable	
Operable flashlights placed in every department and Civil Defense shelter	
Transistor radio operable	
Staff familiarized (by tour, not map) with locations of fire extinguishers, flashlights, radio, Civil Defense shelter, and how to reach members of the in-house disaster recovery team	
Most recent fire drill	
Most recent civil defense drill	
Most recent tornado drill	
Most recent inventory (see IX, page 10)	
Current insurance policy (copy attached)	
Completed copy of "Fire and Insurance Protection of Library Resources — Questionnaire" from *Protecting the Library and Its Resources*, Chicago: ALA, 1963 (copy attached)	

VI. Locations of in-house emergency equipment (attach map or floor plan with locations marked and labeled)

CB radio_____

Cut-off switches and valves:

Electric_____

Gas_____

Water_____

Sprinkler system (if separate)_____

Disaster boxes (see pages 28-30 of the Scottish manual cited on page 11)_____

_____

Fans_____

Fire alarms_____

Fire extinguishers_____

First aid kits_____

Flashlights_____

Freezer or wax paper_____

Fungicides_____

Heavy-duty extension cords_____

Mops_____

Nylon monofilament_____

Paper towel supply_____

Plastic milk crates_____

Plastic sheeting_____

Plastic trash bags_____

Portable generator_____

Rubber gloves_____

Safety helmets (hard hats)_____

Smoke alarms_____

Smoke sponges_____

Sponges, pails, brooms_____

Sump pump or portable pump_____

Transistor radio_____

Unprinted newsprint_____

Water detectors_____

Water hoses_____

Waterproof clothing_____

Wet-dry vacuum_____

Date members of in-house disaster recovery team toured all locations noted above_____

VII. Sources of off-site equipment and supplies

Item	Contact/Company	Telephone number
Deep freeze facilities		
Dehumidifiers		
Drying space		
Extra security personnel		
Fans		
Fork lift		
Library trucks		
Microprocessing laboratory		
Pallets		
Plastic milk crates		
Plastic sheeting		
Portable generator		
Portable sump pump		
Refrigerator trucks		
Unprinted newsprint		
Wet-dry vacuums		

VIII. List all locations where this plan and follow-up reports are on file

Date filed

A. In-house: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

B. Off-site: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

C. O-DRAT: _____

IX. Inventory/Priority lists

Attach hereto, for each department, office, and area, lists of all materials located therein, showing priority for salvage should a disaster occur. To simplify this procedure, assign priorities as follows:

#1 - Salvage at all costs

#2 - Salvage if time permits

#3 - Salvage as part of general clean-up

The following questions may be helpful in determining priorities:

A. Can the item be replaced? At what cost?

B. Would the cost of replacement be less or more than restoration of the item?

C. How important is the item to the collection?

D. Is the item available elsewhere?

Perhaps the highest priority should be given to bibliographic controls of your collection, such as card catalogues, shelf lists, accession records, inventories, and finding aids. It is strongly recommended that duplicate copies of these controls be kept off-site.

Specific collections or areas will most likely be second on your priority list. Staff should know, for example, to salvage historical documents, original paintings, and rare books before the *National Geographic* and *Reader's Digest*.

X. Procedures

Attach hereto a list of specific procedures to be followed in the event of a disaster in your institution, including responsibilities of in-house recovery team members and work crews.

See "Salvage Procedures for Water-Damaged Materials" on pages 14-23. Sources of additional information may be found in the appended bibliography. The following publications are highly recommended:

Anderson, Hazel and John E. McIntyre. *Planning Manual for Disaster Control in Scottish Libraries & Record Offices*. Edinburgh: National Library of Scotland, 1985. Available for £4 from The National Library of Scotland, George IV Bridge, Edinburgh EH1 1EW, Scotland.

Barton, John P. and Johanna G. Wellheiser. *An Ounce of Prevention: A Handbook on Disaster Contingency Planning for Archives, Libraries and Record Centres*. Ontario: Toronto Area Archivists Group Education Foundation, 1985. Available for $17.95 (plus $1.75 postage and handling) from Toronto Area Archivists Group, Post Office Box 97, Station P, Toronto, Ontario M4Y 2L4, Canada.

XI. Follow-up assessment

A written report, including photographs, should be prepared after recovery and attached to all copies of the disaster plan. A copy should also be submitted to ODL/O-DRAT. The report should note the effectiveness of the plan and include evaluations of all sources of supplies and equipment and all off-site facilities used.

DISASTER RECOVERY

If a disaster strikes when the building is occupied, your first concern should be for the safety of the individuals inside. Escape routes, alternate routes, and procedures for evacuating the building should be clear to all personnel and visitors. Practice drills should be conducted on a regular basis to eliminate panic during "the real thing." Drills should be timed. Individuals should be assigned the task of determining whether the building has been completely evacuated.

Most disasters tend to occur when the building is unoccupied — during the early morning hours, on weekends, or during holiday closings. In the event of a major disaster, do not enter the building until it has been declared safe to do so by the Fire Marshal or by Civil Defense personnel.

Ninety-five percent of all disasters will result in water-damaged materials. Keep in mind that mold will develop within forty-eight to seventy-two hours in a warm, humid environment. You must work quickly to salvage damaged materials and to prevent additional damage from occurring.

The following steps are recommended for an effective recovery operation:

I. Assess the damage

How much damage has occurred? What kind of damage is it (fire, smoke, soot, clean water, dirty water, heat, humidity)? Is it confined to one area or is the entire building damaged? How much of the collection has been affected? What types of materials have been damaged (books, documents, microforms, photographs, computer tapes)? Are the damaged items easily replaced or are they irreplaceable? Can they be salvaged by the in- house recovery team, or will outside help be required?

Walk through the entire area and take extensive notes (use a pencil, as ink will run!). Photographs should be taken to document the damages. Contacts should be made at this time with the insurance carrier, sources of supplies and services, and the Oklahoma Disaster Recovery Assistance Team (if necessary).

II. Stabilize the environment

The environment must be stabilized to prevent the growth of mold. Ideal conditions for a recovery operation are 65° F and 50% RH.

The following equipment should be readily accessible to help stabilize the environment:

A. Portable generators, in case a power failure occurs

B. Pumps, to remove large quantities of standing water

C. Fans, to circulate the air

D. Thermometers, hygrometers, hygrothermographs and/or sling psychrometers, to measure the temperature and humidity

Dehumidifiers can help to lower the humidity, although they usually are only effective in small, enclosed areas, and tend to increase the temperature in a room. They can also freeze up in the lower temperatures required for salvage and recovery operations. Raising the temperature will not lower the humidity — it will only accelerate mold growth. Temperature and humidity should be monitored constantly.

The air should be circulated in the damaged area. This may be accomplished by running fans constantly. If possible, they should expel the humid air from the area. Any standing water should be pumped from the area. Extreme caution must be taken, as standing water can conceal hazards.

III. Activate the in-house disaster recovery team

Organize work crews and be sure their responsibilities are clearly defined. No salvage activity should begin until a plan of action has been determined by the team leader. Disaster and recovery areas should be inaccessible to the public.

Frequent rest breaks should be provided for workers. Food and/or beverages should be available.

IV. Remove the area

After the damaged items have been removed and the environment has been stabilized, the area must be thoroughly cleaned. Walls, floors, ceilings, and all furniture and equipment must be scrubbed with soap and water and a fungicide. Carpeting, and especially the padding under it, should be carefully examined, as mold will develop rapidly. Removal of smoke odor and fogging with fungicides or insecticides should be performed only by professionals.

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SALVAGE PROCEDURES FOR WATER-DAMAGED MATERIALS

A number of options are available for treating water-damaged materials. The choice of treatment will depend upon the extent and type of damage incurred, and the manpower, expertise, and facilities available.

I. Vacuum freeze drying

Vacuum freeze drying is the safest and most successful method, although it is also the most expensive. Materials must be frozen when they are placed in a sublimation chamber. This type of chamber operates under high vacuum and high heat, and turns the ice crystals in and on the frozen materials to water vapor. The vapor is then collected on a cold panel that has been chilled to at least -200° F, so it cannot go back on the materials. If they are not frozen when they are put in the chamber, the materials will freeze on the outside and the water molecules on the inside will be forced through the frozen barrier as the vacuum is pulled. This action can cause the book or document to "explode."

When materials are removed from the vacuum freeze chamber, they will be very dry and should acclimate for at least one month before they are opened to avoid cracking the spine and/or binding (this is especially true for leather bindings). They may be placed in a high humidity room to accelerate the acclimation process, but must be monitored closely for signs of mold.

Materials so treated will not look like new, but will show signs of swelling and distortion. Stanford University Library staff members reported they needed an additional twelve percent of shelf space for materials that had been treated in Lockheed's chamber. Photographs will not be damaged by this treatment, but rubber cement may dissolve and stain the pages to which it has been applied.

Lockheed and McDonnell Douglas in St. Louis, Missouri, no longer offer this service to the public. The following companies should be contacted before a disaster strikes to determine which will best meet the needs of your institution. Both can perform on-site recovery operations. Costs may range from $35 to $75 per cubic foot, depending on the amount and type of materials affected and the type of damage.

1. Blackmon-Mooring-Steamatic Catastrophe, Inc. (BMS CAT)
   303 Arthur
   Fort Worth, Texas 76107
   (817) 332-2770
   (800) 433-2940 (24-hour hotline)

2. Munters (formerly Cargocaire) Moisture Control Services
   10561 Goodnight Lane, Suite A
   Dallas, Texas 75220-2404
   (214) 869-1761

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II. Vacuum drying

Vacuum drying involves the placement of wet materials in a chamber that pulls the moisture by means of a vacuum. This method is not recommended as the heat involved is damaging to paper (especially bound paper) and photographic materials. Microwave ovens should not be used for the same reason. In addition, the rapid evaporation of water in the microwave can cause vapor explosions in the covers and inside pages of coated stock.

If frozen materials are vacuum dried, most of the water will pass through the liquid state before vaporizing. As a result, water soluble inks and dyes may bleed.

III. Freezing

Freezing wet materials will stabilize them and provide you with time to determine your course of action. Mold will not grow and further deterioration from water will not occur when materials are in a frozen state. Books have been left in a freezer for ten years and successfully thawed and air-dried with no resultant damage. Freezing will also help to eliminate smoke odor from materials.

Rapid freezing is recommended to minimize damage from ice crystals (the faster the materials are frozen, the smaller the ice crystals will be). Blast freezing services can be performed on-site by several vendors, including BMS CAT.

Temperatures below 15° F will freeze and dry out wet materials. If freezer space is not immediately available, and the outside temperature is below 15° F, place the materials in a secure area outside. Cover them with plastic if rain or snow is expected.

Freezing is an intermediate stage. After materials have been removed from the freezer, they must be placed in a vacuum freeze dryer or air-dried.

IV. Air-drying

Air-drying is labor-intensive and requires a great deal of space, but it is tried, true, and cheap. It also offers security, as it can be done in-house and materials can be watched.

Air-drying should be performed only in a stable environment to inhibit the growth of mold. The ideal environment for air-drying is 50-60° F and 25-35% RH. Instructions are outlined in II below (pages 17-19). This process is not recommended for coated stock materials (see III on page 19 below).

The following salvage procedures are recommended for water-damaged materials:

I. Volumes to be frozen

A. Removal

1. Clear the floors and aisles first.
2. Begin with the wettest materials. These will usually be on the lowest shelves, unless water has come in through the ceiling.
3. Dirt and mold should be removed and treated before freezing (see II.A and VI below). If time does not permit these activities, dirty and/or moldy books may be frozen (mud will easily brush off when it is dry). Silt should be washed out immediately, as it is almost impossible to remove when it is dry.
4. Pack materials on-site, if possible. If not possible, remove by human chain.
5. Keep accurate records of the locations from which materials are removed.

B. Packing

1. Remove volumes from shelves in order.
2. Wrap freezer paper around each volume (waxed side next to the volume) and place in plastic crates spine down.
3. Pack crates one layer only, snugly enough that volumes will not slide or lean.
4. Wrap open books as found and place on top of a packed container. Do not place more than one open volume in a container. Be sure there is a freezer paper barrier between the packed volumes and the open volume to prevent staining from binding dyes.
5. If books are stuck together, do not attempt to separate them, but pack them as one volume.
6. Pack items in the condition in which they are found. Do not attempt to close open volumes or open closed volumes that are wet.

C. Record-keeping

1. Label each container with your institution's name and assign it a number.
2. On a separate sheet of paper, record the box number, call numbers of the first and last

volumes packed, and the total number of books in each container. If they are not in call number order, note the location where found.

3. If the containers are sent to more than one freezer, note which container numbers are sent where.

4. Keep records of damaged items (see page 59 of the Scottish manual cited on page 11)

5. Keep records of discarded items.

D. Transporting

1. Materials should be placed in a freezer facility as quickly as possible to prevent the growth of mold. Care should be taken that containers do not fall over during transport, as further damage may result.

2. Materials should be placed in refrigerated trucks if they cannot be frozen within forty-eight hours.

II. Volumes to be air-dried

A. Washing procedure (to be performed off-site only)

1. Keep the book tightly closed and hold it under cold, clean, running water.

2. Remove as much mud as possible from the binding by dabbing gently with a sponge. Do not rub or use brushes and do not sponge the pages or edges, as these actions can force the mud into the spine or the wet pages, causing further damage to the volume. Let the motion of the running water clean off the dirt.

(NOTE: A more extensive washing procedure, involving a series of rust-proof containers, may be used instead. See page 62 of Barton and Wellheiser's *An Ounce of Prevention*, cited on page 11 above, for instructions.)

3. Squeeze the book gently and with even pressure to remove excess water and to reshape the binding.

4. Do not wash

a. open or swollen volumes

b. vellum or parchment bindings or pages

c. full or partial leather bindings

d. fragile or brittle materials

e. works of art on paper

f. water-soluble components (inks, tempera, water-colors, dyes, charcoal, etc.)

g. manuscripts

B. Saturated volumes

1. Do not open — wet paper tears easily!

2. Set volumes on their heads on absorbent paper. Pages tend to droop within the binding when a volume is shelved upright, so setting it on its head will counteract this tendency. Plastic sheeting should be placed under the paper towelling or unprinted newsprint to protect table tops. Turn the volumes right side up when changing the paper beneath them. Their position should be reversed each time the paper is changed and the wet paper removed from the area.

3. Covers may be opened to support the volume.

4. Aluminum foil may be placed between the cover and the endleaf to prevent staining from the binding dyes.

5. When most of the water has drained, proceed as for "Damp volumes."

C. Damp volumes

1. Very carefully open the book (not more than a 30° angle).

2. Keep the volume in an upright position.

3. Place interleaving sheets at intervals of twenty-five leaves (fifty pages), unless they will distort the volume.

4. Change interleaving frequently. Do not reuse unless the sheets are being impregnated with fungicide. Ortho-Phenyl Phenol (O-PP) has been found to be less toxic than thymol and is recommended. Mix one pound of O-PP to one gallon of acetone or ethanol (do not use methanol, as it will cause inks to bleed). Safety equipment (mask, eye goggles, and rubber gloves) should be worn when preparing and using this solution.

5. Continue to change the paper underneath and remove from the area.

D. Slightly damp volumes/Volumes with only wet edges

1. Stand volume on its head and fan open slightly. Paperback books may support each other with a barrier between them or they may be wedged with styrofoam pieces. Position volumes in the path of circulating air.

2. When almost dry, lay the volumes flat and place weights (not other drying books) on them to minimize distortion. Do not stack wet volumes.

3. Lightweight volumes (less than six pounds) may be hung on lines to dry.

   a. Use monofilament nylon lines, not more than 1/32" diameter, not more than five or six feet long, spaced approximately one-half inch apart.

   b. Do not line-dry a saturated volume as the monofilament will cut through the wet paper.

III. Volumes with coated stock paper

Wet coated stock paper should be handled with care, as the print will slide off the wet page if it is rubbed. Do not allow wet books with coated stock paper to dry in a closed state as the pages will permanently bond together. Almost all attempts to separate stuck pages by rewetting them have failed. Vacuum freeze drying of coated stock volumes is rarely successful. Keep volumes submerged until the pages can be separated (see IV.B below). The only chance of saving such materials is to interleave every page and air-dry.

IV. Documents/Unbound materials

A. Freeze as found

1. Do not remove from file cabinet drawers, document cases, or folders.

2. Do not turn containers upside down to empty or drain.

B. Separation of wet sheets

1. Place a sheet of polyester film on top of a stack of wet, unbound papers (or the first page of a bound volume).

2. Rub gently with a bone folder — surface friction will cause the wet paper to adhere to the film.

3. Peel back the top sheet and place it on top of a piece of polyester web. Non-woven interfacing, such as Pellon, is most effective.

4. Remove the polyester film.

5. Place another piece of polyester web on top of the wet sheet.

6. Repeat the entire process, separating the wet sheets one at a time and interleaving them with polyester web. (Materials may be frozen at this stage.)

7. Air-dry the sheets (supported by the polyester web) by placing them on absorbent paper on tables, on drying racks, or on top of closely spaced monofilament lines. Air in the room should be kept circulating, but fans should not blow directly on the materials.

8. The papers may be flattened when they are almost dry by placing them between two sheets of blotting paper (to remove excess moisture) and applying even pressure with weights.

V. Non-book materials

A. Photographic materials (prints, negatives, slides, film)

Photographic materials should not be allowed to dry untreated after they become wet, as they will stick to their enclosures or to each other. Any attempt to separate them after they have dried together may result in damage to the emulsion or the image. Remove materials from their enclosures and wash off any mud or dirt under cold, clean, running water.

Do not expect to salvage color photographs, as the colored layers will separate and the dyes will fade quickly. However, if you wish to try, air-dry immediately or freeze them.

The following options are available for salvaging photographic materials:

1. Air-dry either flat or on lines of monofilament (plastic spring-type clothespins may be used to hang them on the lines).

2. If there are too many to air-dry immediately, they may be stored temporarily in cold water (65° F or below — cold helps to preserve the emulsion). Ice may be added to the water, but do not add dry ice or allow the materials to remain under water longer than three days.

   Formaldehyde may be added to the water (fifteen milliliters of formaldehyde to one liter of water) to help prevent the gelatin from swelling and softening, and to retard mold growth. The materials should be washed in cold, clean, water after removing

them from this solution. Black-and-white film could last three days in this solution before the emulsion begins to separate; color film could last forty-eight hours.

Transport the materials (in sealed polyethylene bags inside plastic garbage pails) to a professional laboratory within twenty-four hours, if possible.

3. If time does not permit air-drying, the materials may be frozen. As the emulsion may be damaged by the formation of ice crystals, freezing as quickly as possible is recommended (smaller ice crystals will cause less damage). Negatives should be separated before freezing as they tend to stick together when thawed.

B. Microforms

1. Silver halide microfilm

   a. Keep under water (see V.A.2 above) and send to a professional microprocessing laboratory.

   b. The Eastman Kodak Company provides free emergency service for cleaning and drying its own black-and-white roll microfilm. Contact Don Franklin in the Chicago Lab (312-954- 6000).

   c. Fuji Photo Film U.S.A., Inc., offers "No Charge Disaster Recovery Services" for restoration of water-damaged film and for hard copy reproduction of lost or stolen original documents from Fuji microfilm. Contact Joe Cusick in the Carrollton, Texas, Lab (800-241-7695).

2. Vesicular and diazo microfilm

   a. Wash off mud or dirt under cold, clean running water.

   b. Air-dry or dry with cheesecloth.

3. Microfiche

   a. Treat the same as vesicular and diazo microfilm.

C. Tapes (audio, video, computer) and floppy disks

Water is especially damaging to magnetic materials. The longer they have been wet, the greater the damage will be. Do not attempt to play any damaged tapes or disks, as they can damage the equipment on which they are being played. The following procedures are recommended if you wish to attempt to salvage tapes:

1. Break open the cassettes. Remove floppy disks from their cases.

2. Wash in clean or distilled water.

3. Air-dry, dry with cheesecloth, run through a tape cleaner or winder, or gently separate the reel flanges with spacers (such as inert grommets) to allow water to run off, promote air flow, and prevent tape-to-flange adhesion. Do not dry with heated air flow, as it will promote humidity, resulting in adhesion of the media.

D. Sound recordings (disks)

Clean water will not damage sound recordings, but flood water carries silt, which can scratch a disk.Disks should be washed and dried with cheesecloth or a soft, lint-free cloth. Record jackets and protective sleeves should be discarded as they can trap moisture and may develop mold.

E. Art and Artifacts

1. Paintings
   The various media (watercolor, charcoal, oil, acrylic, tempera, etc.) and supports (paper, canvas, cardboard, masonite, wood, etc.) present different problems when wet. Contact a professional conservator.

2. Ceramics, Stone, Glass
   Items made of these materials may be allowed to dry naturally. If they have been exposed to salt water or water mixed with mud, oil, or other pollutants, they should be kept wet until a professional conservator has been consulted.

3. Metals
   Untreated metal objects may oxidize. Iron and steel will oxidize faster than copper and bronze.In most cases, the best treatment for wet metal is to blot it dry. If the item has moving parts (such as a watch or camera), wash it in clean water and freeze it until a conservator can treat it.

4. Wood
   Wood will swell as it absorbs water. Water-damaged wooden objects should be treated by a professional conservator.

VI. Mold

Mold and mildew are interchangeable terms for fungi. They can never be killed and can remain dormant for many years. Spores are always present in the air and will grow when the environment is warm and humid. Freezing will inhibit the growth of mold and is recommended if time does not permit immediate treatment.

VII. Smoke/Fire Damage

A. Mold can develop within forty-eight to seventy-two hours in an environment where the temperature is over 75° F and the relative humidity is over 60%

B. Separate the affected materials to prevent spreading.

C. If the materials are wet and mold is beginning to develop, interleave with papers impregnated with a fungicide (see II.C.4 on page 18 above).

D. Keep the air circulating in the room.

E. Mold is easier to remove when it is dry. Vacuum or brush it off and remove the spores from the area.

F. Materials that will be fumigated should be removed from plastic crates, as plastic will absorb the fumigants. Fungicidal fogging should be done only by a professional chemist or conservator.

Damages resulting from extremely high temperatures are usually irreversible. The information contained on charred materials may sometimes be retrieved through specialized photography. Because of the extremely fragile nature of such materials, they should be handled only by professional conservators.

Smoke sponges are available to remove surface soot and dirt. The closest supplier is Zephyr Manufacturing, 400 West Second Street, Post Office Box 71, Sedalia, Missouri 65302-0071; (816) 827-0352; FAX (816) 827-0713.

Freezing may help to remove smoke odor from materials.

VIII. DO NOT, UNDER ANY CIRCUMSTANCES,

...enter an area until it has been declared safe.

...attempt to open a wet book (one tear costs at least one dollar to mend!).

...attempt to close an open book that is swollen.

...use mechanical presses on wet materials.

...attempt to separate books that are stuck together.

...write on wet paper.

...use bleaches, detergents, water-soluble fungicides, adhesive tapes (or adhesives of any kind), paper clips, or staples on wet materials.

...use colored paper of any kind during salvage and recovery operations.

...pack newly-dried materials in boxes or leave them unattended for more than two days.

O-DRATI
1-800-522-8116

The Oklahoma Disaster Recovery Assistance Team (O-DRAT) was created to provide on-site salvage assistance and/or advice in the event a disaster strikes any library or records repository in the State of Oklahoma. The following individuals may be called:

Gary Harrington
Preservation Officer
and Head, State Archives Division
Oklahoma Department of Libraries
200 North East 18th
Oklahoma City, OK 73105
(405) 521-2502
1-800-522-8116

Toby Murray
Preservation Officer
McFarlin Library
University of Tulsa
600 South College Avenue
Tulsa, OK 74104
(918) 631-3800

Be sure to provide the following information when requesting on-site disaster recovery assistance:

1. Your name, title, institution, and telephone number.
2. A description of the disaster and the time it is believed to have struck.
3. The extent and type of damage involved, including the types of materials affected.
4. Whether or not the in-house recovery team has been activated and the type of salvage operation planned or underway.
5. The salvage and recovery supplies on hand and those that will be needed.
6. Whether or not funding is available for the purchase of additional supplies and the name and telephone number of the individual authorized to approve such purchases.
7. Whether or not the utilities are functioning.
8. Directions for reaching the site and a description of the individual to contact upon arrival.

BIBLIOGRAPHY

Bibliography on Disasters, Disaster Preparedness and Disaster Recovery will be distributed with these guidelines. As this bibliography is updated periodically, a copy of the most recent update may be obtained free upon request from Gary Harrington, Preservation Officer and Head, State Archives Division, Oklahoma Department of Libraries, 200 North East 18th, Oklahoma City, OK 73105 (405-521-2502 or 800-522-8116) or from the compiler, Toby Murray, Preservation Officer, McFarlin Library, University of Tulsa, 600 South College Avenue, Tulsa, OK 74104 (918-631-3800). A 10"x12" self-addressed, stamped ($2.13) envelope would be appreciated.

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NFPA 101, *Life Safety Code*, 1991 edition

NFPA 204M, *Guide for Smoke and Heat Venting*, 1991 edition

NFPA 220, *Standard on Types of Building Construction*, 1985 edition

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 1989 edition

NFPA 251, *Standard Methods of Fire Tests of Building Construction and Materials*, 1990 edition

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Appendix A Glossary of Fire Protection Systems

This Appendix is not a part of the recommendations of this NFPA document but is included for information purposes only.

Most fires that occur in libraries can be expected to fall into one or more of the following categories:

Class A. Fires involving ordinary combustible materials, such as paper, wood, textile fibers, etc., where a cooling, blanketing, or wetting extinguishing agent is required.

Class B. Fires involving oils, greases, paints, and flammable liquids, where a smothering or blanketing action is required.

Class C. Fires involving live electrical equipment where a nonconducting extinguishing agent with a smothering action is required.

Glossary of Fire Protection Systems

The following information has been prepared to assist in the description and evaluation of the principal kinds of detection systems, signaling systems, and extinguishing systems that are appropriate for use in libraries.

Fire Detection Systems

Type	Description	Comments
1. Smoke detection systems.	These systems use devices that respond to the smoke particles produced by a fire. They operate on the ionization, photoelectric or cloud chamber principle of operation. Spot-type smoke detectors use either the ionization principle of operation or the photoelectric principle. Line-type smoke detectors use the photoelectric principle. Air sampling-type smoke detectors use either the ionization, photoelectric, or cloud chamber principle. Properly installed, smoke detectors can detect smoke particles in very early stages of fire in the areas where they are located.	Intended for early warning. Some are designed for installation in ventilation ducts. See NFPA 72E, *Standard on Automatic Fire Detectors*.
2. Heat detection systems.	These systems use heat-responsive devices either of the "spot" or "line" type. They are mounted either on exposed ceiling surfaces or a side-wall near the ceiling. Heat detectors are designed to respond when the operating element reaches a predetermined temperature (Fixed Temperature Detector), when the temperature rises at a rate exceeding a predetermined amount (Rate-of-Rise Detector), or when the temperature of the air surrounding the device reaches a predetermined level, regardless of the rate of temperature rise (Rate Compensation Detector). Some devices incorporate both fixed temperature and rate-of-rise detection principles. "Spot" detectors are usually small devices a few inches in diameter. "Line" detectors are usually lengths of heat-sensitive cable or small bore metal tubing.	Relatively low cost. Cannot detect small, smoldering fires. Line-type detectors can be installed in a relatively inconspicuous manner by taking advantage of ceiling designs and patterns. See NFPA 72E, *Standard on Automatic Fire Detectors*.

Fire Detection Systems (continued)

3.	Flame detection systems.	These systems use devices that respond to the appearance of radiant energy visible to the human eye (approximately 4000 to 7000 Angstroms) or to the radiant energy outside the range of human vision. Flame detectors are sensitive to glowing embers, coals, or actual flames, which radiate to the detectors energy of sufficient intensity and spectral quality to initiate the detector.	Since flame detectors are essentially line-of-sight devices, special care should be taken in applying them to assure that their ability to respond to the required area of fire in the zone that is to be protected will not be unduly compromised by the presence of intervening structural members or other opaque objects or material. See NFPA 72E, *Standard on Automatic Fire Detectors*.

Fire Signaling Systems

	Type	Description	Comments
1.	Local protective signaling system.	An alarm system operating in the protected premises, responsive to the operation of a manual fire alarm box, waterflow in a sprinkler system, or detection of a fire by a smoke, heat, or flame detecting system.	The main purpose of this system is to provide an evacuation alarm for the occupants of the building. Someone must always be present to transmit the alarm to fire authorities. See NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*.
2.	Auxiliary protective signaling system.	An alarm system utilizing a standard municipal fire alarm box to transmit a fire alarm from a protected property to municipal fire headquarters. These alarms are received on the same municipal equipment and are carried over the same transmission lines as are used to connect fire alarm boxes located on streets. Operation is initiated by the local fire detection and alarm system installed at the protected property.	Reliable, fast means of summoning help from municipal fire department. Some communities will accept this type of system and others will not. See NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*.
3.	Central station signaling system.	An alarm system connecting protected premises to a privately owned central station whose function is to monitor the connecting lines constantly and record any indication of fire, supervisory, or other trouble signals from the protected premises. When a signal is received, the central station will take such action as is required, such as informing the municipal fire department of a fire or notifying the police department of intrusion.	Flexible system. Can handle many types of alarms, including trouble within system at protected premises. See NFPA 71, *Standard for the Installation, Maintenance, and Use of Signaling Systems for Central Station Services*.
4.	Remote station protective signaling system.	An alarm system connecting protected premises over leased telephone lines to a remote station such as a fire station or a police station. Includes separate receiver for individual functions being monitored, such as fire alarm signal or sprinkler waterflow alarm.	Requires leased lines into each premises. See NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*.
5.	Proprietary protective signaling system.	An alarm system that serves contiguous or noncontiguous properties under one ownership from a central supervising station at the protected property. Similar to a central station system but owned by the protected property.	Requires 24-hour manning of central supervising station on the premises. See NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*.
6.	Emergency voice/alarm communication system.	This system is used to supplement one of the systems listed above by providing voice communication within the building for use during a fire emergency either with prerecorded messages or for use by the fire department, or both.	See NFPA 72, *Standard for the Installation, Maintenance, and Use of Protective Signaling Systems*, and NFPA 72G, *Guide for the Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems*.

Fire Extinguishing Systems

	Type	Description	Comments
1.	Wet-pipe automatic sprinkler system.	A permanently piped water system under pressure, using heat-actuated sprinklers. When a fire occurs, the sprinklers exposed to the high heat open and discharge water individually to control or extinguish the fire.	Automatically detects and controls fire. May cause water damage to protected books, manuscripts, records, paintings. Not to be used in spaces subject to freezing. See NFPA 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 22, *Standard for Water Tanks for Private Fire Protection*.
2.	Preaction automatic sprinkler system	A system employing automatic sprinklers attached to a piping system containing air that may or may not be under pressure, with a supplemental fire detection system installed in the same area as the sprinklers. Actuation of the fire detection system by a fire opens a valve that permits water to flow into the sprinkler system piping and to be discharged from any sprinklers that are opened by the heat from the fire.	Automatically detects and controls fire. May be installed in areas subject to freezing. Minimizes the accidental discharge of water due to mechanical damage to sprinkler heads or piping and thus is useful for the protection of paintings, drawings, fabrics, manuscripts, specimens, and other valuable or irreplaceable articles that are susceptible to damage or destruction by water. See NFPA 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 22, *Standard for Water Tanks for Private Fire Protection*.

Fire Extinguishing Systems (continued)

Type	Description	Comments
3. On-off automatic sprinkler system.	A system similar to the preaction system, except that the fire detector operation acts as an electrical interlock, causing the control valve to open at a predetermined temperature and close when normal temperature is restored. Should the fire rekindle after its initial control, the valve will reopen and water will again flow from the opened heads. The valve will continue to open and close in accordance with the temperature sensed by the fire detectors. Another type of on-off system is a standard wet-pipe system with on-off sprinkler heads. Here each individual head has incorporated in it a temperature-sensitive device that causes the head to open at a predetermined temperature and close automatically when the temperature at the head is restored to normal.	In addition to the favorable feature of the automatic wet-pipe system, these systems have the ability to automatically stop the flow of water when no longer needed, thus eliminating unnecessary water damage. See NFPA 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 22, *Standard for Water Tanks for Private Fire Protection*.
4. Dry-pipe automatic sprinkler system.	Has heat-operated sprinklers attached to a piping system containing air under pressure. When a sprinkler operates, the air pressure is reduced, a "dry-pipe" valve is opened by water pressure, and water discharges from any opened sprinklers.	See No. 1. Can protect areas subject to freezing. Water supply must be in a heated area. See NFPA 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 22, *Standard for Water Tanks for Private Fire Protection*.
5. Standpipe and hose system.	A piping system in a building to which hoses are connected for emergency use by building occupants or by the fire department.	A desirable complement to an automatic sprinkler system. Staff requires training to use hoses effectively. See NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.
6. Halon automatic system.	A permanently piped system using a limited stored supply of a halon gas under pressure and discharge nozzles to totally flood an enclosed space. Released automatically by a suitable detection system. Extinguishes fires by inhibiting the chemical reaction of fuel and oxygen.	No agent damage to protected books, manuscripts, records, paintings, or other irreplaceable valuable objects. No agent residue. Although Halon 1301 vapor has low toxicity, its decomposition products, during a fire, can be hazardous. Therefore the fire area should be promptly evacuated. Halon 1211 total flooding systems are prohibited in normally occupied areas. Halons may not extinguish deep-seated fires in ordinary solid combustibles such as paper, fabrics, etc., but are effective on surface fires in these materials. These systems require special precautions to avoid damage effects caused by their extremely rapid release. The high velocity discharge from nozzles may be sufficient to dislodge substantial objects directly in the path. Discussions have been taking place about the future availability of Halon because of its ozone depleting characteristics. See NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, and NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*.
7. Carbon dioxide automatic system.	Same as No. 6, except uses carbon dioxide gas. Extinguishes fires by reducing oxygen content of air below combustion support point.	Same as No. 6. Appropriate for service and utility areas. Personnel must evacuate before agent discharge to avoid suffocation. May not extinguish deep-seated fires in ordinary solid combustibles such as paper, fabrics, etc., but effective on surface fires in these materials. See NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*.
8. Dry chemical automatic system.	A permanently piped system that discharges a dry chemical from fixed nozzles by means of an expellant gas. The system either totally floods an enclosed space or applies the dry chemical directly onto the fire in a local application. The dry chemical extinguishes fires by the interaction of the dry chemical particles to stop the chain reaction that takes place in flame combustion. The dry chemical is released mechanically or with a suitable detection system.	Where personnel may be exposed to a dry chemical discharge, suitable safeguards must be provided to ensure prompt evacuation of the area. Leaves powdery deposit on all exposed surfaces. Requires cleanup. Excellent for service facilities having kitchen range hoods and ducts. May not extinguish deep-seated fires in ordinary solid combustibles such as paper, fabrics, etc., but effective on surface fires in these materials. See NFPA 17, *Standard for Dry Chemical Extinguishing Systems*.

Fire Extinguishing Systems (continued)

Type	Description	Comments
9. High expansion foam system.	A fixed extinguishing system that generates a foam agent for total flooding of confined spaces and for volumetric displacement of vapor, heat, and smoke. Acts on the fire by: a. Preventing free movement of air b. Reducing the oxygen concentration at the fire c. Cooling. Released automatically by a suitable detection system.	Where personnel may be exposed to a high expansion foam discharge, suitable safeguards must be provided to ensure prompt evacuation of the area. The discharge of large amounts of high expansion foam may inundate personnel, blocking vision, making hearing difficult, and creating some discomfort in breathing. Leaves residue and requires cleanup. High expansion foam, when used in conjunction with water sprinklers, will provide more positive control and extinguishment than either extinguishment system used independently, when properly designed. See NFPA 11A, *Standard for Medium- and High-Expansion Foam Systems*.
10. Wet chemical extinguishing system.	Same as No. 6, except uses liquid agent usually released by automatic mechanical thermal linkage. Effective for restaurant, commercial, and institutional hoods; plenums; ducts; and associated cooking appliances.	Leaves agent residue that is confined to the protection area(s). Requires cleanup. Excellent for service facilities having range hoods and ducts. See NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*.

Appendix B Resources

This Appendix is not a part of the recommendations of this NFPA document but is included for information purposes only.

A fire protection consultant can be a valuable resource in evaluating the current status of firesafety for a library and in recommending creative solutions to improve firesafety and achieve firesafety goals. In order to realize maximum benefit from engaging a fire protection consultant, the consultant's qualifications and the client's needs should be properly matched. The consultant should have qualifications equivalent to Member grade in the Society of Fire Protection Engineers.

One should evaluate the consultant's experience, both as a company and as individual consultant team members in providing fire protection consulting services to libraries. Other experience that might also be considered is that for historic buildings or structures and museums.

One should also compare the consultant's experience with the nature of the work to be performed and the size of the project being considered. As a final evaluation factor for experience, one should consider whether the specific team proposed has worked together and the degree to which the experience is team experience.

Other factors that should be used in evaluating a consultant's qualifications are membership and participation in organizations such as NFPA, The American Institute of Architects for registered architects, the National Society of Professional Engineers for registered engineers, and the model building code organizations. Participation on committees of these organizations is a further measure of the consultant's understanding of library firesafety issues.

After having collected information on the fire protection consultant's qualifications, one should contact references to determine how the consultant has actually performed on similar projects.

B-1 NFPA. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA publishes this and related documents on fire protection, and they will answer inquiries on these documents. They also conduct educational seminars, studies, and literature searches for a fee.

NFPA maintains a list of fire protection consultants.

B-2 SFPE. Society of Fire Protection Engineers, 60 Batterymarch Street, Boston, MA 02116.

SFPE is a professional society of fire protection engineers. They meet annually, publish technical information, conduct technical seminars, and support local chapters. Members are located in all parts of the world. Names and addresses of members in a particular geographic area may be obtained from society headquarters.

B-3 NICET. National Institute for Certification in Engineering Technologies, 1420 King Street, Alexandria, VA 22314.

NICET certifies technicians in the following areas of fire protection: (a) automatic sprinkler system layout, (b) special hazards system layout (automatic and manual foam water, halon, carbon dioxide, and dry chemical systems), and (c) fire detection and alarm systems. People with a NICET certification can also assist in the selection and use of fire protection systems. NICET provides certification for four levels of competence in all three of the listed areas of fire protection.

B-4 UL. Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062.

UL has a certification service through which alarm companies may be qualified to issue certificates that installed fire warning systems comply with NFPA standards and are properly tested and maintained. A list of alarm service companies authorized to issue UL certificates is available. UL also publishes safety standards and annual directories of labeled and listed products and fire resistant assemblies.

the bindings and the edges of books will be quickly attacked by mold, especially when in warm, unventilated areas. A different problem exists for books printed on coated stock, since if they are allowed to dry in this condition, the leaves will be permanently fused together.

Summary of Emergency Procedures

1. It is imperative to seek the advice and help of trained conservators with experience in salvaging water-damaged materials as soon as possible. The Library of Congress is an excellent information source for technical advice where needed. Contact: Preservation Office, Library of Congress, Washington, DC, Telephone (202) 707-5212.

2. Turn off heat and create free circulation of air.

3. Keep fans and air conditioning on at night, except when a fungicidal fogging operation is in process, because a constant flow of air is necessary to reduce the threat of mold.

4. Brief each worker carefully before salvage operations begin, giving full information on the dangers of proceeding except as directed. Emphasize the seriousness of timing and the priorities and aims of the whole operation. Instruct workers on means of recognizing manuscripts, materials with water-soluble components, leather and vellum bindings, materials printed on coated paper stock, and photographic materials.

5. Do not allow workers to attempt restoration of any items on site. (This was a common error in the first ten days after the Florence flood, when rare and valuable leather- and vellum-bound volumes were subjected to scrubbing and processing to remove mud. This resulted in driving mud into the interstices of leather, vellum, cloth, and paper, caused extensive damage to the volumes, and made the later work of restoration more difficult, time consuming, and extremely costly.)

6. Carry out all cleaning operations, whether outside the building or in controlled environment rooms, by washing gently with fresh, cold running water and soft cellulose sponges to aid in the release of mud and filth. Use sponges with a dabbing motion; do not rub. These instructions do not apply to materials with water soluble components. Such materials should be frozen as quickly as possible.

7. Do not attempt to open a wet book. (Wet paper is very weak and will tear at a touch.) Hold a book firmly closed when cleaning, especially when washing or sponging. A closed book is highly resistant to impregnation and damage.

8. Do not attempt to separate single-sheet materials unless they are supported on polyester film or fabric.

9. Do not attempt to remove all mud by sponging. Mud is best removed from clothes when dry; this is also true of library materials.

10. Do not remove covers from books, as they will help to support the books during drying. When partially dry, books may be hung over nylon lines to finish drying. Do not hang books from lines while they are very wet because the weight will cause damage to the inside folds of the sections.

11. Do not press books and documents mechanically when they are water soaked. This can force mud into the paper and subject the materials to stresses that will damage their structures.

12. Use soft pencils for making notes on slips of paper but do not attempt to write on wet paper or other artifacts.

13. Clean, white blotter paper, white paper towels, strong toilet paper, and unprinted newsprint paper may be used for interleaving in the drying process. When nothing better is available, all but the color sections of printed newspapers may be used. Great care must be taken to avoid rubbing the inked surface of the newspaper over the material being dried; otherwise some offsetting of the ink may occur.

14. Under no circumstances should newly dried materials be packed in boxes and left without attention for more than a few days.

15. Do not use bleaches, detergents, water-soluble fungicides, wire staples, paper or bulldog clips, adhesive tape, or adhesives of any kind. Never use felt-tipped fiber or ballpoint pens or any marking device on wet paper. Never use colored blotting paper or colored paper of any kind to dry books and other documents.

✱ Appendix E Firesafety Inspection Form for Libraries

This Appendix is not a part of the recommendations of this NFPA document but is included for information purposes only.

NFPA 910, *Recommended Practice for the Protection of Libraries and Library Collections*, provides guidance to library trustees, directors and other responsible staff members in the area of firesafety. The self-inspection form that follows will help in implementing some of the practices recommended. It will enable library officials to evaluate the state of their preparedness and will point out situations requiring remedial action.

This self-inspection form is intended for staff use at regular, frequent intervals. It should not take the place of two other vital measures—the thorough, objective, periodic inspection of the library by municipal fire inspectors or by firesafety specialists, and the regular testing of fire detection and extinguishing installations by specialists in their maintenance.

Libraries vary widely in character. Not all of the points to be inspected apply in every case. By striking out those that obviously do not fit local circumstances, a library can tailor this form to its specific needs.

These self-inspections should do more than disclose conditions of negligence that could be the source of fire or that might result in greater damage and, possibly, loss of life in the event of fire. The primary purpose is to secure the correction of these conditions. Therefore it is imperative that all questions answered "No" be referred to the responsible department or staff member. Then it becomes an important function of management to make sure that corrective action has been taken.

FIRESAFETY SELF-INSPECTION FORM FOR LIBRARIES

General Conditions

1. Construction:
   fire resistive _____, noncombustible _____,
   combustible _____
   (*See NFPA 220, Standard on Types of Building Construction.*)

2. Size:
   floor area _____
   number of floors _____
   number of connecting buildings or wings _____
   number of entrances _____
   number of emergency exits _____
   number of exit width units available _____
   number of employees _____
   number of readers and other visitors per day
   average _____
   maximum _____
   Number of exit width units required by NFPA *101, Life Safety Code* _____

3. Exposures:

	Serious	Moderate	Light	None
north				
east				
south				
west				

   (*See NFPA 80A, Protection of Buildings from Exterior Fire Exposures.*)

4. Water Supply:
   municipal system _____, reservoir/pond _____,
   storage tanks _____
   capacity _____
   size of water mains _____
   distance from hydrants _____

5. Fire Service:
   municipal fire department _____, facility library brigade _____, both _____
   time required for fire service to reach library _____

6. Fire Protection:

	Yes	*No*	*Partial*
standpipe system			
sprinkler system			
automatic fire detection system			
insert gas extinguishing system			
interior fire alarm system			
direct alarm to fire service			
monitored night guard service			
*fire walls and self-closing fire doors protecting horizontal openings between building units			
*furnace room separated from rest of library by fire walls and self-closing fire doors			
*fire walls and self-closing fire doors separating hazardous operations from areas containing library collections			
*fire-resistive enclosures protecting stairways and other vertical openings			
*exit doors opening outward			
*locked exit doors equipped with panic hardware			

*(*See NFPA 101, Life Safety Code.*)

List any changes in character of buildings, occupancy, water supply or hydrants, accessibility or other general conditions affecting firesafety since the previous inspection: _____

General Inspection

	Yes	*No*
1. Roof:		
is roof covering noncombustible?		
are scuppers and drains unobstructed?		
are lightning arrestors in good condition?		
are skylights protected by screens?		
is access to fire escapes unobstructed?		
do fire escape stairs appear to be in good condition?		
are fire escape stairs unobstructed?		
are standpipe and sprinkler roof tanks and supports in good condition?		
are standpipe and sprinkler control valves secured in proper position?		
2. All Floors (inspect from top floor to basement):		
are self-closing fire doors unobstructed and properly equipped with closing device?		
are fire exits and directional signs properly illuminated?		
is emergency lighting system operable?		
are corridors and stairways unobstructed?		
are fire exits unlocked and unobstructed?		
are sprinklers unobstructed?		
are standpipe hose outlets properly marked and unobstructed?		
are sprinkler control valves properly labeled and unobstructed?		
are recorded weekly inspections made of all sprinkler control valves to make certain they are open?		
are dry-pipe valves (for sprinklers in areas exposed to freezing) in service, with air pressure normal?		
are all fire-detection and fire-suppression systems in service and tested regularly?		

	Yes	No
are sufficient fire extinguishers present?	___	___
are extinguishers of the proper type? (*See NFPA 10, Portable Fire Extinguishers.*)	___	___
are extinguishers properly hung and labeled?	___	___
are extinguishers properly charged and tagged with inspection tags?	___	___
is housekeeping properly maintained?	___	___
are cleaning supplies safely stored?	___	___
are all trash receptacles emptied at least daily?	___	___
are supply closets and slop sink areas clean and orderly?	___	___
are electric hot plates, coffee makers and space heaters prohibited or limited to those with an appropriate automatic shutoff bearing the label of a recognized testing laboratory?	___	___
3. Ground Floor:		
do entrance and exit doors provide unobstructed egress?	___	___
is safe egress uncompromised by security measures?	___	___
4. Basement:		
is rubbish removed from the building daily?	___	___
is rubbish removed from the premises on a regular schedule?	___	___
are stocks of flammable liquids stored away from the building?	___	___
are sprinklers unobstructed and at least 18 in. above top of storage?	___	___

Special Area Inspection

	Yes	No
1. Reading Rooms, Study Carrels and Exhibit Areas:		
is a high standard of housekeeping maintained by employees and readers?	___	___
are smoking regulations enforced with employees, readers and visitors?	___	___
are aisles to exit routes unobstructed and visible?	___	___
is proper salvage equipment to protect the catalogue ready for use?	___	___
are exhibit housings, fittings and other accessories noncombustible or fire retardant treated?	___	___
do temporary wiring and lighting conform to NFPA 70, *National Electrical Code*?	___	___
do all electrical components bear the label of a testing laboratory?	___	___
have exhibit installations kept fire hose outlet valves and fire alarms unobstructed and visible?	___	___
2. Collections Storage Areas: (bookstacks, etc.):		
is appropriate fire extinguishing equipment at hand and unobstructed?	___	___
is "first aid" fire extinguishing augmented by an early warning automatic fire detection system?	___	___
do fire alarms go directly to municipal fire service?	___	___
are these areas separated by appropriate fire walls and fire doors from other occupancies?	___	___
have all vertical and horizontal openings in fire barriers been adequately fire stopped?	___	___
is smoking prohibited in these areas?	___	___
are exit signs and exit directional signs properly placed and illuminated?	___	___
are ways of exit access and egress unobstructed?	___	___
is proper salvage equipment ready for use?	___	___
does fire service have access to these areas?	___	___
are collections protected by appropriate automatic extinguishing systems?	___	___
3. Bookbinding and Restoration Shops and Conservation Laboratories:		
are flammable solvents and other chemicals properly labeled and stored in small quantities in ventilated safety storage cabinets?	___	___
are flammable liquids dispensed from safety cans?	___	___
are self-closing safety waste disposal receptacles available at work stations?	___	___
are laboratory wastes disposed of daily with appropriate special precautions?	___	___
are spray coating facilities adequately and safely ventilated?	___	___
is electrical equipment in the spray area explosionproof?	___	___
does the spray area have automatic fire extinguishing equipment?	___	___
do shop and laboratory electrical equipment bear the label of a testing laboratory?	___	___
do electrical appliances have warning lights?	___	___
are appliances unplugged when not in use?	___	___
are exit routes unobstructed?	___	___
are employees aware of special hazards and trained in necessary precautions?	___	___
is fire suppressant and personnel safety equipment appropriate for the special hazards that may be present?	___	___
is entry limited to authorized persons?	___	___

4. Other Shops and Packing/Unpacking Areas:
   - are paints, thinners, cleaning solvents and other flammable liquids properly stored in reasonable quantities in ventilated safety cabinets? ___ ___
   - are thinners and solvents dispensed from safety cans? ___ ___
   - are self-closing waste receptacles used for oily rags and other wastes liable to spontaneous heating? ___ ___
   - are flammable packing materials stored in self-closing safety containers? ___ ___
   - are power tools and machines properly grounded? ___ ___
   - do woodworking machines have proper dust collectors? ___ ___
   - are dust collector bins emptied regularly? ___ ___
   - do paint spraying facilities comply with local codes? ___ ___
   - does welding equipment meet local codes? ___ ___
   - are power tools unplugged when not in use? ___ ___
   - are exit routes unobstructed? ___ ___
   - are sufficient fire extinguishers of appropriate type present for extra hazards associated with this kind of occupancy? ___ ___
5. Auditoriums and Classrooms:
   - is safe capacity posted? ___ ___
   - is occupancy restricted to the capacity posted as safe? ___ ___
   - are standing and sitting in aisles prohibited? ___ ___
   - do furnishings and wall coverings comply with firesafety standards? ___ ___
   - are exits unobstructed, unlocked and properly illuminated? ___ ___
   - are aisles unobstructed? ___ ___
   - does projection room meet local codes? ___ ___
   - are smoking regulations enforced? ___ ___
6. Restaurant or Tearoom:
   - is capacity posted? ___ ___
   - is occupancy limited to safe seating capacity? ___ ___
   - are aisles of sufficient width to comply with NFPA *101, Life Safety Code*? ___ ___
   - are exit routes unobstructed and properly illuminated? ___ ___
   - *are ranges, hoods and exhaust ducts cleaned? ___ ___
   - do exhaust ducts terminate in a safe area? ___ ___
   - are grease ducts and deep fryers equipped with automatic fire detectors and extinguishing systems? ___ ___
   - if below ground level, is area sprinklered? ___ ___

*Note date when ranges, hoods and exhaust ducts were last cleaned. ___

Exterior Inspection

1. Evacuation:
   - have all exits, emergency exits, and fire escapes unobstructed passage to safe areas? ___ ___
2. Environment:
   - are grounds clear of accumulations of flammable material? ___ ___
   - have neighboring occupancies minimized exterior fire hazards? ___ ___
   - is fire service access clear? ___ ___
   - are standpipe and sprinkler systems siamese connections unobstructed and operable? ___ ___
   - are hydrants unobstructed? ___ ___

Personnel Inspection

1. Training:
   - do all staff members know how to transmit a fire alarm? ___ ___
   - do all staff members know their assigned duty in evacuating the library? ___ ___
   - do all staff members know how and when to use portable fire extinguishers? ___ ___
   - do all staff members know their responsibilities in fire prevention? ___ ___
2. Organization:
   - is the fire protection manager or a designated alternate on duty? ___ ___
   - does the fire protection manager have an adequate training program in operation for himself/herself and the staff? ___ ___
   - is the written fire emergency plan up to date and properly distributed? ___ ___
   - has the fire service planned or trained for: protecting the library since the previous inspection? ___ ___
   - emergency operations (e.g., salvage, reports to authorities and news media)? ___ ___

Note date of latest fire drill. ___

Special Comments:

Inspection made by: _____ Date: _____
Title: _____
Report reviewed by: _____ Date: _____
Title: _____

Corrective Action:

Item	*Referred to*

Corrective actions completed: _____ Date: _____
Fire Protection Manager: _____

Publications Available From
The National Fire Protection Association
(1-800-344-3555) Partial Listing Only
Last Update: October 1992

NFPA 10	Portable Fire Extinguishers: Installation, Use and Maintenance. 1990.
NFPA 12	Carbon Dioxide Extinguishing Systems. 1989.
NFPA 12A	Halon 1301 Fire Extinguishing Systems. 1989.
NFPA 12B	Halon 1211 Fire Extinguishing Systems. 1990.
NFPA 13	Installation of Sprinkler Systems. 1991.
NFPA 13A	Inspection, Testing, and Maintenance of Sprinkler Systems. 1987.
NFPA 14	Standpipe and Hose Systems. 1990.
NFPA 14A	Inspection, Testing, and Maintenance of Standpipe and Hose Systems. 1989.
NFPA 17	Dry Chemical Extinguishing Systems. 1990.
NFPA 25	Inspection, Testing and Maintenance of Water Based Fire Protection Systems. 1992.
NFPA 40	Cellulose Nitrate Motion Picture Film. 1988.
NFPA 70E	Electrical Safety Requirements for Employee Workplaces. 1988.
NFPA 71	Installation, Maintenance, and Use of Signaling Systems for Central Station Service. 1989.
NFPA 72	Installation, Maintenance, and Use of Protective Signaling Systems. 1990.
NFPA 72E	Automatic Fire Detectors, 1990.
NFPA 72G	Installation, Maintenance, and Use of Notification Appliances for Protective Signaling Systems. 1989.
NFPA 72H	Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems. 1988.

NFPA 101	Life Safety Code. 1991.
NFPA 101M	Alternative Approaches to Life Safety. 1992.
NFPA 110	Emergency and Standby Power Systems. 1988.
NFPA 203	Roof Coverings and Roof Deck Constructions. 1992.
NFPA 220	Standard Types of Building Constructions. 1992.
NFPA 232	Protection of Records. 1991.
NFPA 232AM	Archives and Record Centers. 1991.
NFPA 550	Firesafety Concepts Tree. 1986.
NFPA 704	Identification of the Fire Hazards of Materials. 1990.
NFPA 903	Fire Reporting Property Survey Manual. 1992.
NFPA 904	Incident Follow-Up Report Manual. 1992.
NFPA 910	Libraries and Library Collections. 1991.
NFPA 911	Museums and Museum Collections. 1991.
NFPA 913	Historic Sites and Structures. 1987.
NFPA	Fire Protection Guide on Hazardous Materials. 10th ed.
NFPA	Fire Protection Handbook. 17th ed.

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Emergency
Management

EMERGENCY SALVAGE OF PHOTOGRAPHS

Because of the number of photographic processes and their wide variety, responsible advice for the emergency salvage of wet photographs is difficult to provide. Some processes can withstand immersion in water for a day or more, whereas others would be permanently disfigured or even destroyed by a couple of minutes exposure. In general wet photographs should be air dried or frozen as quickly as possible. Once stabilized by either of these methods, there is time to decide what future course of action to pursue.

Ideally salvage should occur under a conservator's supervision. A conservator can minimize damage to a collection if there is the opportunity to direct the salvage and treat the collection immediately after the damage has occurred. Time is of the essence. The longer the period of time between the emergency and salvage, the greater amount of permanent damage that will occur.

1. Minimize Immersion Time.

Photographs in water will quickly deteriorate: images can separate from mounts, emulsions can dissolve away or stick together, staining can occur. Mold is another problem. Mold begins to grow within 48 hours at 60% RH and 70°F. Mold often causes permanent staining and other damage to photographs. For these reasons photographs need to be dried as quickly as possible. If photographs cannot be dried they should be frozen.

2. Salvage Priorities for Wet Photographs

- In general films (plastic base materials) appear to be more stable than prints, therefore, prints should be salvaged first. Important exceptions include deteriorated nitrate and safety films, which are extremely susceptible to water damage.
- Processes that should be salvaged first include: ambrotypes, tintypes, collodion wet plate negatives, gelatin dry plate negatives, lantern slides, deteriorated nitrate or safety film, autochromes, carbon prints, woodburytypes, deteriorated or unhardened gelatin prints, color materials. Many of these processes will not survive any immersion.
- Processes that are more stable in water include: daguerreotypes, salted paper prints, albumen prints, collodion prints, platinum prints, cyanotypes.

3. Air Drying Photographs.

- If personnel, space and time are available photographs can be air dried.
- Separate photographs from their enclosures, frames, and from each other. If stuck together or adhered to glass, set them aside for freezing and consult a conservator.
- Allow excess water to drain off the photographs.
- Spread the photographs out to dry, face up, laying flat on an absorbent material such as blotters, unprinted newsprint, paper towels, or a clean cloth.
- Photographs may curl during drying. They can be flattened later.

4. Freezing Photographs.

- If immediate air drying of photographs is not possible or if photographs are stuck together, freeze them.
- Place the photographs in small plastic bags before freezing, several to a bag.
- If possible, interleave photographs before freezing with a non-woven polyester material or wax paper. This will make them easier to separate when they are eventually treated.

5. Drying Frozen Photographs.

- Frozen photographs are best dried by thawing, followed by air drying. As a group of photographs thaws, individual photographs can be carefully peeled from the group and placed face up on a clean, absorbent surface to air dry.
- Vacuum thermal drying, where the frozen material is thawed and dried in a vacuum, is not recommended for photographs. Gelatin photographs undergoing this procedure have a tendency to severely mottle and stick together.
- Photographs can be vacuum freeze dried; in this process no thawing occurs. Gelatin photographs may mottle during the procedure, but they won't stick together.
- Wet collodion glass plates must never be freeze-dried; they will not survive. This would be true for all similar collodion processes such as ambrotypes, collodion lantern slides, and tin-types.

6. Salvaging Slides.

- Slides can be rinsed and dipped in "Photo-flo", slide cleaner, or a similar commercial product and air dried, preferably hung on a line or propped on edge.
- Ideally, slides should be removed from their frames for drying and then remounted.
- Slides mounted between glass must be removed from the glass or they will not dry.

7. Call a Qualified Conservator.

Dried or frozen photographs are reasonably stable. Store them until you can talk to a conservator who has experience with photographs and can advise you of treatment needs.

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Emergency Management

INFORMATION NEEDED FOR DISASTER PLANNING

1. Name of institution: _____

   Date of completion or update of this form: _____

   Staff members to be called in case of disaster:

Position	Name	Home Phone	Specific Responsibility in Case of Disaster
Chief Administrator			
Disaster Recovery Team Leader			
Person in charge of building maintenance			
Cataloger/ Registrar			
Preservation administrator, Conservator			
In-house disaster recovery team members			

II. Other Services Needed in an Emergency:

Service	Company and/or Name of Contact	Phone #
In-house security		
Fire Department		
Police-or Sheriff		
Ambulance		
Civil Defense		
Professional Advice/ Conservator		
Insurance Company		
Freezer		
Freeze-dry Service		
Fire Recovery/Salvage		
Water Recovery/Salvage		
Computer Records Salvage		
Computer Emergency		
Legal Advisor		
Electrician		
Plumber		
Carpenter		
Exterminator		
Fumigation Service		
Locksmith		
Utility Companies		
Architect or Builder		
Janitorial Service		
Glazier		
Photographer		
Other		

III. In-House Emergency Equipment: (List locations and attach floor plans with locations labeled)

A. Keys

B. Main Utilities:

1. Main electrical cut-off switch:

2. Main water shut-off valve:

3. Main gas shut-off:

4. Sprinkler system:

5. Heating/cooling system:

C. Nearest CB radio:

D. Fire extinguishers:

Number by type: Wood, paper, combustible (Type A)
Gasoline and flammable liquid (Type B):
Electrical (Type C):
Type ABC:

E. Master fire alarm (pull box):

F. Smoke and heat detectors:

G. Flashlights:

H. Portable pump (if one on site):

I. Plastic sheeting (stored with scissors and tape):

J. Paper towel supply (if kept on site):

K. First aid kit:

L. Metal book trucks:

M. Clipboards:

N. Portable folding tables:

O. Portable fans:

P. Drying space:

Q. Emergency funds: cash -
purchase orders -

Have all members of Disaster Team toured A-Q above? Date

IV. Off-Site Emergency Equipment and Supplies:

Item	Supplier	Phone Number
Dehumidifiers		
Drying Space		
Refrigerator trucks		
Metal book trucks		
Plastic (milk) crates		
Portable generator		
Portable sump pump		
Portable lighting		
50 ft. Extension cords (grounded)		
Heavy plastic sheeting		
Portable electric fans		
Wet vacuum		
Extra security personnel		
Blank newsprint		
Dry ice		
Freezer or wax paper		
Plastic trash bags		
Plastic buckets and trash cans		
Paper towels		
Portable tables		
Water hoses		
Sponges, mops, pails		
Monofilament nylon (fishing) line		
Brooms		
Gloves (rubber/leather)		
Rubber boots and aprons		
Safety glasses		
Other		

V. Upkeep Checklist:

A. Keys and window locks secure, and keys accounted for?

B. Emergency numbers posted near every telephone?

C. Last inspection by local fire department official?

Frequency of inspections

1. Fire extinguishers updated and operable?

2. Smoke and/or heat detectors operable?

3. Sprinkler system operable?

4. Water detectors operable?

5. Halon system operable?

6. Fire alarms operable?

D. Flashlights operable:
(one in each dept., public desk and civil defense shelter)

E. Transistor radio operable?

F. Staff familiar (by tour, not map) with location of thermostats, regular exits, fire exits, fire extinguishers, flashlights, radio, civil defense shelter, and where to reach disaster recovery team members?

G. Last fire drill?

Frequency?

H. Last civil defense drill?

Frequency?

I. Date of last analysis/update of insurance coverage?

Frequency?

J. Photographs of interior and exterior?

K. Is there a record (microform, computer tape) of the collection off-site?

Frequency of update?

Location?

VI. Insert Copies of Last Inventory Report and Insurance Policies Here

VII. Salvage Priorities:

Compile a list of items that should be salvaged first following a disaster for each department, area, and/or office. Keep these considerations in mind when setting priorities.

A. Is the item critical for ongoing operations of the institution?

B. Can the item be replaced? (Cost figures should include ordering, cataloging, shipping, etc. in addition to the purchase price.)

C. Would the cost of replacement be more or less than the cost of restoring the object?

D. Is the item available in another format, or in another collection?

E. Does the item have a high or low collection priority?

F. Does the item require immediate attention because of its composition (coated paper, vellum, water-soluble inks)?

VIII. Disaster Team Records:

A. Who on the staff has a copy of this plan and is familiar with its contents?

B. List all locations where this plan is on file (on and off premises).

IX. Compile and attach a list of procedures to be followed in case of disaster. These should accommodate your institution's particular needs and collections. The following provide procedures and guidelines:

Barton, John P. and Joanna G. Wellheiser, (eds). An Ounce of Prevention: Handbook on Disaster Planning for Archives, Libraries, and Record Centres. Toronto: Toronto Area Archivists Group Education Foundation, 1985. (P.O. Box 97, Station F., Toronto, Ontario M4Y 2L4).

Buchanan, Sally A. Disaster Planning: Preparedness and Recovery for Libraries and Archives. Paris: Unesco, 1988.

Eulenberg, Julia Niebuhr. Handbook for the Recovery of Water Damaged Business Records. Prairie Village, KS:. Association of Records Managers and Administrators, 1986.

Fortson-Jones, Judith. Disaster Planning and Recovery: A How-To-Do-It Manual for Librarians and Archivists. New York: Neal-Schuman, 1992.

List of Disaster Supplies and Suppliers. Los Angeles Preservation Network, 1991. (Available from University of California at Los Angeles, c/o Preservation Office, 11334 University research Library, Los Angeles, CA 90024-1575. $15 handling charge, includes updates).

New York University Preservation Committee. Disaster Plan Workbook. New York: New York University, Bobst Library, 1984.

O'Connell, Mildred. "Disaster Planning: Writing and Implementing Plans for Collections-Holding Institutions." Technology and Conservation (Summer 1983): 18-24.

Rhodes, Barbara J. (comp.). Hell & Highwater: A Disaster Information Sourcebook. METRO Misc. Pub. 35, 1988. New York: METRO (57 Willoughby Street, Brooklyn, NY 11201).

Solley, Thomas T., Joan Williams, and Linda Baden. Planning for Emergencies: A Guide for Museums. Washington, DC: Association of Art Museum Directors, 1987. (Available from American Association of Museums, 1225 Eye Street, NW, Washington, DC 20005)

Waters, Peter. Procedures for Salvage of Water-Damaged Library Materials. Washington, DC: Library of Congress, 1979.

This material is based on statewide disaster plans developed by the State Libraries of Wyoming and Iowa, and is used with their kind permission.

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TECHNICAL
LEAFLET

Emergency Management

SECURITY FROM LOSS: WATER AND FIRE DAMAGE, BIOLOGICAL AGENTS, THEFT AND VANDALISM

WATER AND FIRE DAMAGE

Protection from water damage is essential to the preservation of library and archival materials. Even a minor water accident such as a leaky pipe can cause extensive and irreparable harm to collections. Several precautions can be taken. Roof coverings and flashings should be inspected regularly and repaired or replaced as needed. Gutters and drains should be cleaned frequently. Materials should never be stored under water pipes, steam pipes, lavatories, mechanical air-conditioning equipment, or other sources of water. Neither should they be stored directly on the floor, but instead at least four inches above the floor. Storage in basements or in other areas where the threat of flooding is great should be avoided. If collections must be stored in areas where they are vulnerable to flooding, water-sensing alarms should be installed to insure quick detection of water.

Disaster planning is an important component of overall preservation planning. A systematically organized, formally written plan enables you to respond efficiently and quickly to an emergency, minimizing danger to staff and damage to collections and the building. Such a plan should cover preventive measures as well as recovery procedures. It should include a training component. All staff should be familiar with the location and operation of shut-off valves for water-bearing pipes for buildings where collections are housed. The plan should be reviewed with staff regularly, at least annually. The plan should include lists of steps to follow if a disaster strikes and sources of assistance and supplies most likely needed. The importance of having the plan in written form cannot be overstated. In the excitement and confusion of an emergency, procedures and sources of help are easily forgotten. Information recorded in writing is much less likely to be overlooked. Much valuable time can be lost during emergencies if staff members are unfamiliar with recovery methods. Copies of the plan should be distributed to key personnel assigned responsibility for disaster prevention and recovery. Several copies of the plan should be stored off-site as well as in the building where materials are housed.

Damage caused by fire can be even more serious than that caused by water. If collections survive at all, they are likely to be charred, covered with soot, brittle from exposure to high heat, wet from water used to extinguish the fire, moldy, and/or smelling of smoke. Several fire suppression methods are available. Every institution should have at least one method in operation.

Automatic sprinklers are now considered by most fire safety professionals, librarians, archivists, and conservators to be the best protection from fire for libraries and archives. Sprinklers that have controlled-flow or on/off heads are deemed the most desirable. These release water when activated by heat sensors in response to fire, and turn off when the fire is extinguished. Collections of very special value, which may be irretrievably damaged by water from a sprinkler system, have until recently often been protected by an automatic halon gas suppression system. Halon, which extinguishes fire by interfering with the combustion process, has been considered ideal for collections of high value because it does not leave water

or a harmful chemical residue on materials. However, halon, which contains chlorofluorocarbons, will become unavailable in the near future for reasons of environmental protection. Other methods of fire suppression for collections of special value are being developed. At the very least, every storage and use area should have several portable fire extinguishers of the ABC dry chemical type, and staff should be trained in their use. Whatever fire suppression system an institution has should be regularly inspected and properly maintained. The manufacturer's specifications should be followed.

All repositories that house library and archival materials should be equipped throughout with heat and smoke sensors wired directly to the local fire department or to another 24-hour monitor. Fixed-temperature heat sensors by themselves are insufficient, because they will not detect smoldering fires; rate-of-rise sensors should also be installed since they are activated by a sudden, small increase in temperature. Smoke sensors alone are inadequate since they have a relatively high rate of mechanical failure. All detectors should be regularly tested and maintained according to the manufacturer's specifications.

Staff members should work with the local fire department to develop a fire safety program. All existing fire hazards should be eliminated. Regular fire inspections and drills should be held, and staff should be trained in evacuation procedures. The disaster plan should outline the steps to follow should a fire occur. A systematic disaster plan should cover all hazards that pose a reasonable threat to collections.

BIOLOGICAL AGENTS

The primary biological agents that cause damage to library and archival collections are mold, rodents, and insects, although dogs, cats, birds, and humans also harm materials. Mold damage can pose a serious threat, especially in institutions located in a hot, humid climate or near a large body of water where humidity is high. Mold spores are ever-present in the environment. Mold damage can be devastating and measures should be taken to avoid its occurrence. It is most important to maintain proper levels of temperature and relative humidity, good circulation of air, and clean, clutter-free storage areas. Ideally temperature should never go above 70°F or relative humidity above 50%. The higher the temperature and humidity, the greater the risk of mold. If a water-related emergency occurs, such as a flood or fire, wet materials should be dealt with immediately before mold growth develops.

Once mold growth appears, the affected items should be isolated from the collection. Gloves and a respirator should be worn when handling moldy materials. The items should be dried thoroughly and, once dry, the mold should be removed from them. A conservator should be contacted for advice on how best to do this given the particular circumstances of the situation.

Library and archival materials are appetizing to rodents and insects, and all possible steps should be taken to control them. They are attracted by clutter and food remains. Clutter, dust and dirt should not be allowed to accumulate, and storage areas should be kept clean at all times. Eating and drinking should be prohibited in buildings containing collections, especially in storage areas. Staff members should eat only in a staff room, located as far away from collections as possible. All garbage receptacles containing food should be removed from buildings every day. High temperature and, in particular, high relative humidity also encourage rodent and insect activity. Windows, doors and vents should be kept closed as much as possible because insects enter through these. Buildings should be well maintained because cracks or breaks in the building fabric are another point of entry. Grass and plantings should be trimmed back at least 18 inches from a building that houses collections. If possible all materials entering the building should be checked for rodents and especially insects. This includes new items for the collection, items being returned after a loan, and all equipment, supplies, and packing materials.

Once an infestation is discovered, immediate action is required. A variety of traps for catching rodents are available commercially, but hiring a professional exterminator is advisable for reasons of staff safety. If an insect infestation is discovered, the affected items should be isolated from the rest of the collection. Items adjacent to affected ones should also be isolated. The insect should be identified, as this will aid in extermination and may help determine the source of the infestation. Spray-type insecticides should not be sprayed directly on collections; the chemicals may damage them. Freezing has recently become the preferred method of treating insect-infested library and archival materials, because this method avoids the use of toxic chemicals. Jane Green-

field discusses the process in The Care of Fine Books, New York: Nick Lyons Books; 1988, p. 68-69. Blast freezing at -20°F has been tested and proven effective. The Greenfield book should be consulted for further information.

THEFT AND VANDALISM

Because of the high value of materials in libraries and archives, adequate protection from theft and vandalism must be provided. This protection can range in complexity from simple locks to elaborate security systems. In general, libraries and archives that house collections of permanent value should be well secured during hours when the building is closed to the public. The best protection is provided by perimeter intrusion alarms and internal motion detectors wired directly to the local police department or to another outside 24-hour monitoring agency. During working hours it is best to have only one entrance/exit, to be used by researchers and staff alike. All other doors should be alarmed so that unauthorized use can be detected. Windows should be kept closed and locked. Building keys and keys to areas where materials of special value are kept should be strictly limited. A list of keyholders should be kept current, and staff members should be required to return keys when they leave the employ of the institution. Access to storage areas should be strictly limited, and researchers should be accompanied by a staff member if they enter these areas.

Use of materials by researchers should be carefully controlled and strictly monitored. Researchers should never be left unattended. Ideally, they should use materials in a room separate from book storage areas. Coats, bags, and personal books should be left outside the reading area and researchers should be allowed to bring only a pencil and paper into the room. Researchers should sign a register, present an identification card, and leave that identification card in the hands of a staff member, who should retrieve the requested object. Requests for the use of materials in special collections should be made in writing. Call slips should be retained to provide a record of use. One object at a time should be given to researchers. If several objects are needed, they should be carefully counted out by the staff member in front of the researchers before and after use. Staff should check the materials visually before and after use for evidence of vandalism. Identification cards should be returned to researchers only when the objects are returned to the staff member and when the staff member is satisfied that no damage has been done.

If you discover that valuable materials have been stolen from your collection, consult the following for information on what action to take: "Guidelines Regarding Thefts in Libraries," by William Moffett in College and Research Libraries News, March 1988, p. 159-62, and Rare Books and Manuscript Thefts by John J. Jenkins, Antiquarian Booksellers Association of American, NY, 1982. You will need a way to prove ownership of valuable materials. Marking the item itself is a curatorial decision. Written descriptions as well as photographs or high-quality photocopies of identifying details should be kept on file.

Suggested Further Reading

Barton, John P. and Johanna C. Wellheiser (eds). An Ounce of Prevention: A Handbook on Disaster Contingency Planning for Archives, Libraries, and Record Centres. Toronto: Toronto Area Archivists Group Education Foundation, 1985

Bohem, Hilda. Disaster Prevention and Disaster Preparedness. Berkeley, CA: Office of the Assistant
Vice-President, Library Plans and Policies, University of California, Berkeley, 1978.

Greenfield, Jane. The Care of Fine Books. New York: Nick Lyons Books, 1988.

Jenkins, John J. Rare Books and Manuscript Thefts: A Security System for Librarians, Booksellers and Collectors. New York: Antiquarian Booksellers Association of America, 1988.

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Nyberg, Sandra. "The Invasion of the Giant Spore." SOLINET Preservation Program Leaflet No. 5. Atlanta, GA: SOLINET (November 1987): 19 pp.

RBMS Security Committee, Gary L. Menges, Chair. "ACRL Guidelines for the Security of Rare Books, Manuscript and other Special Collections."

College and Research Libraries News 51(3) (March 1990): 240-244.

RBMS Security Committee, William A. Moffett, Chair. "Guidelines Regarding Thefts in Libraries." College and Research Libraries News 49(3) (March 1988): 159-62.

Trinkaus-Randall, Gregor. "Preserving Special Collections Through Internal Security." College and Research Libraries. 50(4) (July 1989): 448-454.

Waters, Peter. Procedures for the Salvage of Water-Damaged Library Materials. Washington, DC: Library of Congress, 1979.

Zycherman, Linda (ed). A Guide to Museum Pest Control. Washington, DC: The American Institute for Conservation of Historic and Artistic Works (AIC), Assoc. of Systematics Collections, 1988, 205 p.

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Disaster Planning:

Writing & Implementing Plans for Collections-Holding Institutions

Mildred O'Connell, *Field Service Director, Northeast Document Conservation Center*

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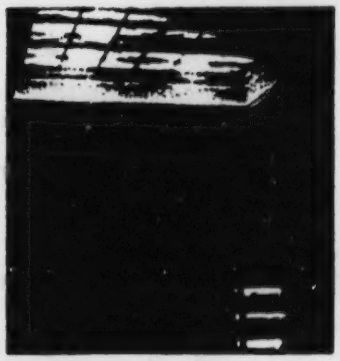
Renaissance treasures in Florence endangered by unprecedented flooding. In 1966, newspaper headlines like this one revealed the vulnerability of books, documents, and art objects to nature's forces and focused attention on international efforts to save them. Since that time, other disasters affecting such materials have received coverage by the media. In 1972, uncontrollable flood waters caused extensive damage to library materials in Corning, New York. A great fire at the Charles Klein Law Library at Temple University in the same year damaged or destroyed 400,000 volumes there. Professional conservators worked with volunteers to rescue these collections, employing techniques which had proved successful in Florence, as well as methods developed subsequently for drying masses of wet books and documents.

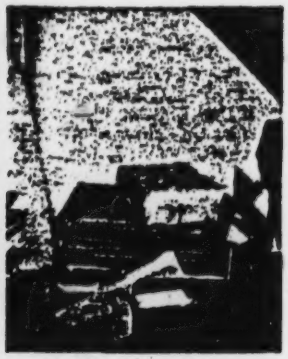
Although these dramatic events heightened awareness among those who care for collections, few institutions have actually taken steps to prevent disasters or to plan for recovery after disaster strikes. Yet no facility is immune from damage caused by water inundation, nor is any institution exempt from risk of fire. While most disasters will be relatively minor compared with those mentioned above, e.g., a leaking roof which allows water to drip on a valuable print below, the end result – wet paper – is the same and the damage is just as serious for the objects involved.

An Ounce of Prevention . . .

Planning ahead for disaster not only reduces permanent damage or loss to collections, but also sometimes actually prevents disasters from happening. It is therefore essential that librarians, curators, and others who are entrusted by the public to preserve our cultural inheritance take an active role in developing disaster plans. Planning includes assessing building problems which might endanger collections, citing and correcting existing hazards, and listing steps required to save collections, should fire or flood occur. A written disaster prevention/recovery plan should be made available to all staff members who work in these institutions.

Left: A preventive maintenance program which includes proper sealing of skylights and repair of roof defects will reduce the possibility of damage, from water leakage during rain or snow storms, to collections housed below. Right: Storing of books and other archival materials on a basement floor should be avoided. Placing these items on shelves will lessen the risk of their being soaked if flooding occurs.





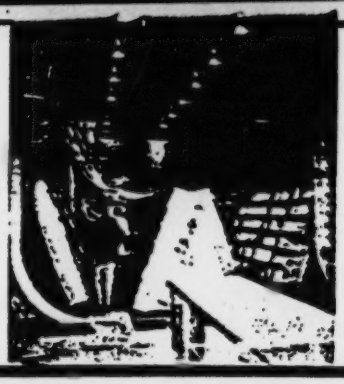
The concept of disaster planning is a relatively new one to most librarians and curators. Its importance is clearly demonstrated by the alarming frequency with which calls for help are received by the Northeast Document Conservation Center (NEDCC), a regional conservation treatment facility in Andover, Massachusetts. NEDCC offers disaster assistance to institutions experiencing fire or flood damage and receives an average of one or two calls each week. Often the damage affects a limited number of objects and can be handled relatively easily. For example, 100 books which got wet when an ice dam melted on the roof of the Peterborough (New Hampshire) Town Library were air dried by the library staff without real loss or permanent damage. But sometimes, many thousands of objects are involved and the course of action becomes logistically complicated. The drying of 5,000 wet architectural drawings for a Cambridge-based architectural firm or the treatment of 14,000 fire-damaged books at Brunswick Junior High School in Maine are typical examples of more serious salvage situations.

Many people who seek disaster assistance have little knowledge of the steps to take or the outside resources available to help them salvage their collections. In fact, some callers do not make inquiries about saving water-damaged objects until they have become moldy. Unfortunately, many more disaster victims never get the advice they require and valuable materials in their care are lost forever. This need not be so.

There is no question that many disasters can be prevented entirely if common sense is used when determining where and how collections are stored. Thoughtful planning by architects and by those responsible for collection care can avoid some problems before new construction or space utilization schemes are finalized. For example, the rare book room at a large university in Massachusetts was located by the architect directly below the air conditioning equipment, a potential water hazard. When the mechanical system failed, a large number of rare books were thoroughly soaked. Similarly, boxes of books or other materials stored on the basement floor instead of on shelves obviously face a greater chance of being damaged by water should flooding occur.

For existing repositories, a careful survey can help to identify potential sources of damage to books and other collections. The assistance of people who are familiar with plumbing, electrical wiring, and fire protection can be particularly useful in this process. Many hazards can be quite easily eliminated once they are identified, thereby averting disaster.

Surveys should begin with an examination of the roof and drains. The roof should receive periodic inspection and repair as needed. Repairs should not be confined to patching leaks as they occur. (If the roof is under warranty, warranty instructions should be followed.) Flashings should be inspected



As a result of the floods in Florence in 1966, in Corning, New York in 1972, and similar events, as well as several major fires where extinguishing the conflagrations led to extensive soaking of library/archival materials, researchers have developed new methods and new technology for safely and efficiently recovering wet paper from such disasters. Vacuum freeze-dry chambers, such as the one seen here, have been used with much success to dry masses of wet books and documents. (Photo, courtesy of Lockheed Corporation.)

visually and replaced as needed. Gutters and drains must be cleaned regularly and frequently in order to prevent back-up of water.

One library reported regular annual flooding because the drains were never cleaned and became clogged with leaves each fall. This example and numerous others highlight the importance both of recognizing the source of trouble and of taking corrective action to avoid repetition of such incidents.

The roofs of some older buildings drain through iron pipes located inside the building walls. These deteriorate and have been the source of water damage to several library collections in the Northeast region. In some cases, the roof itself is made of inappropriate materials. The glass roof of Phillips Academy Library in Andover, Massachusetts, for instance, leaked for more than sixty years before it was finally replaced by a copper roof. During those years, collections were continually exposed to water leakage.

Storing collections in areas which are especially vulnerable to water should be avoided. Certainly, rare book rooms and vaults, which presumably contain the most precious collections, should never be located underneath lavatories, air conditioning equipment, or water pipes. However, sometimes potential hazards to collections are not so obvious. This was the case when a file cabinet containing important historical documents at a public library in New Hampshire was inadvertently placed directly under a very large fish tank in the children's room on the level above.

Storing collections on the floor, as previously mentioned, should also be avoided, even if it is only to be for a brief period of time. A college library in Maine recently learned that lesson the hard way when boxes of books temporarily placed on the floor in a basement stack became water damaged during a construction accident. All collections should, instead, be raised up several inches off the floor. If the placement of collections in vulnerable areas cannot be altogether avoided, then a water sensing alarm should be purchased and wired to an outside monitor so that flooding can be detected even when the institution is unattended.

While defective HVAC systems, deteriorated roofs, and inappropriate storage arrangements can be controlled in order to protect objects from water damage, other causes of flooding are not so readily dealt with. Some institutions are, unhappily, situated in a place which is subject to natural disaster, e.g., in a flood plain, on the seacost. Although little can be done to prevent such disasters from happening short of moving the repository itself, steps can be taken to prevent damage to collections.

If possible, basement and first floor storage should be avoided for any collections of value. The Connecticut Historical Society suffered extensive damage when a stream flooded in 1955. In order to prevent a recurrence of flooding, the organization has improved its defenses in several ways, including building up the grade between the stream and the building to form a dike and adding backflow valves to the storm drains.

If an institution is located in a vulnerable area and flooding becomes imminent, an emergency plan written in advance should provide for measures such as moving collections to higher levels, boarding up windows, and wrapping the card catalogue in heavy-duty plastic sheeting and securely strapping it. In addition, a checklist of tasks should be prepared, and the most observant staff member(s) selected for making the final check before leaving the building. (These tasks would include, for example, closing electrical master switches and shutting off gas at the mains.)

Thus, a survey of existing building problems can minimize the possibility of flood damage to collections. The possibility of fire can be reduced in much the same way. Many preventive measures can help to prevent the fire entirely, for instance, correction of defective heating systems, installation of heavy duty wiring to prevent electrical overloading, storage of flammable liquids in proper containers and cabinets, and good housekeeping and maintenance. Equally important is the installation of modern fire protection equipment. All too many institutions have either inadequate or no fire detection or extinguishing equipment at all. This not only endangers collections and the building itself, but also jeopardizes the safety of the staff and of the general public.

National experience has demonstrated that collections are best protected from fire if fire is quickly detected and if the response of the fire department is rapid. All collections-holding repositories should be equipped with smoke and heat detectors wired directly to the local fire department or to a central monitoring agency. The lack of such devices often has catastrophic results. For instance, the absence of fire detectors caused a recent incident of arson at the Brunsick (Maine) Junior High School to go undetected until the fire reached great proportions and finally set off the sprinklers which were located in the corridors. Delay in detecting this fire caused extensive damage to the building itself and to 14,000 books

Collections-holding institutions should be equipped with fire detectors. These sensors should be wired directly to the local fire department or to a central monitoring station to allow rapid response by fire fighters. (Photo, courtesy of New Jersey Division of Archives and Records Management.)

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Polyester sheeting is used to cover objects in collections to protect them from exposure to water that might enter the building when windows are broken or a roof is damaged during a severe storm. Repairs, naturally, should be made as quickly as possible.

Near right:
In the aftermath of a fire or flood, if collections are damp or wet and the environment is warm and humid, salvage/treatment efforts should begin immediately to prevent the growth of mold, such as occurred on this book. (Photo, courtesy of George Cunha.)
Right:
If the library materials are only charred, they need not receive such immediate attention. (Photo, courtesy of George Cunha.)

in the library.

If collections are very valuable, then fire extinguishing equipment should also be installed. Some collections will warrant the expense of installing a halon gas extinguishing system which will put out a fire without water and without leaving a harmful chemical residue. Once installed, all detection and extinguishing equipment should be tested regularly and frequently. Annual testing may not be enough.

In addition, staff members should be trained in emergency and evacuation procedures, and regular fire drills should be held.

Who's Where . . . & Doing What – The Importance of People & Priorities

Once the building has been made as safe as possible for collections and obvious hazards have been eliminated, disaster planning should focus on identifying staff, supplies, and outside resources needed during an emergency. Such planning will help to eliminate panic and will save time when time is critical to the salvage of collections.

Planning should include forming a disaster team of staff members who would help carry out the salvage effort. This team should include the chief administrator, the person in charge of collections, the person in charge of collections records, and a representative from the physical plant department, among others. One person should be named leader of the team, and it is that person who should ultimately be responsible for decisions made during the recovery effort. This person need not be the chief administrator, but could be any person on the staff who has a cool head in time of emergency. A list of the names and telephone numbers of team members should be drawn up and circulated within the institution. A copy of the list also should be provided to the local police and fire departments.

Air drying of library materials should be carried out in a large clean space which has a cool, dry environment and good air circulation. In addition, there should be proper security in this area.

A second list which details emergency resources outside the institution will help greatly in expediting operations following a disaster. Among services which might be needed are fire and police departments, electricians, plumbers, carpenters, janitorial services, ambulance services, glaziers, conservators, insurance representatives, and security guards. Suppliers of electrical fans, plastic milk cartons, trucks, plastic sheeting, and absorbent paper should be identified, and some of these supplies possibly purchased and kept on hand. A local cold storage warehouse and a freeze-dry facility should be contacted. This compilation of resources and suppliers should be made available to all members of the disaster team.

Most important to the process of preparing ahead of time for disaster is the identification of collection priorities. Valuable objects in the collection should be identified before an emergency occurs so that they are salvaged first. A priority list will guide disaster team members in their work and will help ensure the rescue of the most important collections. In this way, unnecessary expenditure of time and energy on collections that can be easily replaced will be avoided.

The location of high priority collections should be clearly marked on a floor plan, a copy of which should be given to members of the disaster team as well as to the local fire and police departments. Priority should always be given to the salvage of the catalogue and other collections records.

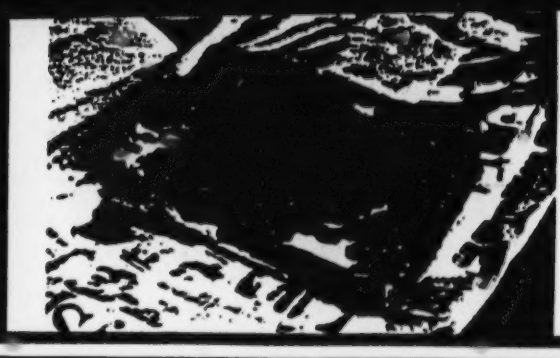
Immediate Attention Required . . . Or Reconditioning in the Future?

The actual recovery process following a disaster must also be planned in advance. Disasters can generally be divided into those involving fire damage and those involving water damage. Unfortunately, many fire-damaged materials also become wet during the fire fighters' efforts to extinguish fire by hosing down with water.

The first step to be taken after disaster strikes is to evaluate the extent of the damage. Care must of course be taken entering flooded or fire-damaged buildings; sometimes collections salvage is complicated by the fact that the building is declared unsafe to enter for several days. However, once staff members are able to gain access to the building, they should examine collections according to priorities, which it is hoped were set beforehand.

Material that is damaged beyond salvage or nor worth saving should be discarded. Time wasted salvaging ordinary newspapers or periodicals or salvaging publications which can be replaced for less money than they could be repaired for might result in the loss of valuable research materials and special collections.

If library materials are only charred or damaged by soot and smoke, there is no need to take care of them immediately. Fire-damaged materials are stable. Conservators at NEDCC have only recently treated documents damaged during the



Information on Personnel & Equipment Needed for Disaster Planning

A Basic Checklist of Sources of Assistance & Supplies and of Procedures

Adapted from a Northeast Document Conservation Center form

(The NEDCC form is based on the statewide disaster plans developed by the State Library of Iowa and the State Library of Wyoming, which were used with the permission of these organizations.)

The following data should be gathered, and all of the results compiled in a document which would be readily accessible if an emergency arose.

I. Date of completion or update of this compilation.

II. Staff members to be called in case of disaster, including the person's name, home phone number, and specific responsibilities in the case of a disaster. (If the job category includes more than one individual, include the data for all persons in the group. For large institutions, data on a "second-in-command" person for each position may be useful.)

- Chief Administrator
- Building Maintenance Supervisor/Manager
- Cataloger/Registrar
- Preservation Administrator or Conservator
- In-house Disaster Recovery Team Members

III. Other services possible needed in an emergency, including the organization's or individual's name and phone number. If the service is provided by an organization, the name of a specific contact person should be listed if possible.

- Fire Department
- Police or Sheriff
- Ambulance
- Civil Defense
- Regional Conservation Center/ Disaster Assistance Organization
- Insurance Company
- Lawyer/Legal Advisor
- Electrician
- Plumber
- Carpenter
- Exterminator
- Chemist
- Mycologist
- Locksmith
- Utility Companies
- Architect or Builder
- Janitorial Service
- Glazier
- Security/Guard Service

IV. System upkeep and staff awareness, including the date checked and if remedial action is required, what steps are being taken.

1. Locks of doors and windows secure and keys accounted for?
2. Emergency numbers posted near every telephone?
3. Last inspection by local fire department official?
4. Fire extinguishers, including any halon systems, updated?
5. Fire safety equipment operable?
   - –Smoke alarms
   - –Sprinkler system
   - –Portable extinguishers
   - –Halon system
6. Water detectors operable?
7. Flashlights operable (one in each department, public desk, and Civil Defense shelter)?
8. Transistor radio operable?
9. Staff familiarized (by tour, not map) with locations of fire extinguishers, flashlights, radio, CD shelter, and where to reach members of the disaster recovery team?
10. Last fire drill?
11. Last Civil Defense drill?
12. Date of last analysis and update of insurance coverage?

Insert copies of the organization's last inventory report and insurance policies here.

V. In-house emergency equipment, listing locations and attaching floor plans with the locations labeled.

- Main utilities:
  1. Main electrical cut-off switch
  2. Main water shut-off valve
  3. Main gas shut-off
  4. Sprinkler system
- Nearest CB radio
- Fire extinguishers
- Smoke alarms
- Portable pump (if one is on site)
- Plastic sheeting (should be stored with scissors and tape)
- Paper towel supply (if kept on site)
- First aid kit

Have all members of the disaster recovery team toured all of these locations? Date of tour? (The team should be made aware of any equipment additions or changes in the location of supplies, and these additions/changes also noted on the floor plans.)

VI. Off-site emergency equipment and supplies, listing supplier and the company's/institution's phone number. (If any of these items are on-site, note location and staff member responsible for the item.)

- Library trucks
- Drying space
- Refrigerator trucks
- Deep freeze facilities
- Freeze dry facilities
- Dehumidifiers
- Plastic crates, such as used to transport milk cartons
- Portable electric sump pump
- Heavy duty extension cords
- Rolls of plastic sheeting
- Thymol crystals and denatured alcohol
- Electric fans
- Extra security personnel
- Unprinted newsprint
- Dry ice
- Freeze or wax paper
- Plastic trash bags
- Paper towels
- Water hoses
- Sponges, mops, pails
- Brooms
- Rubber gloves

VII. Procedures and priorities

Compile and attach a list of procedures to be followed in case of disaster, which will accommodate your institution's particular needs.

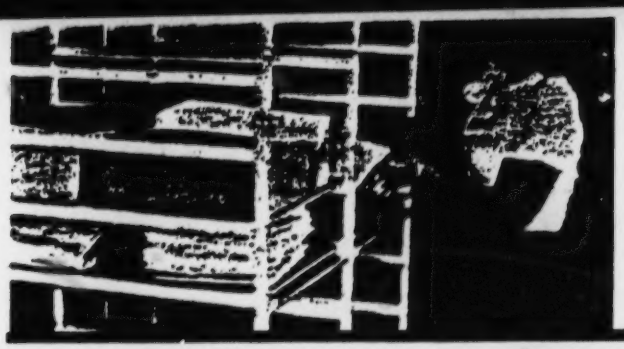
In devising the appropriate procedures, a list should be developed, for each department and for each office, of materials which should be salvaged *first* following a disaster. Keep the following considerations in mind when setting priorities:

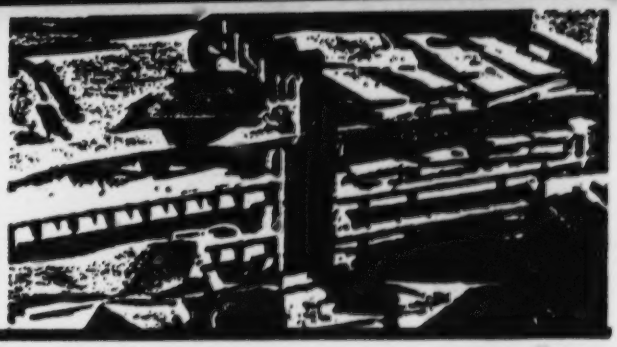
1. Can the item be replaced? At what cost? (Cost figures should include ordering, cataloging, etc., in addition to the purchase price.)
2. Would the cost of replacement be less or more than the cost of restoring the object?
3. How important is the object to the collection?
4. Is the object available elsewhere?

VIII. Disaster team records

Indicate the full-time staff member who has a copy of this plan and is familiar with its contents.

List all locations where this plan is on file, both on and off the premises. (At least one copy of the plan should be on-site and one copy off-site.)





great New York State Library Fire of 1911. Book pages can be trimmed, books rebound, and soot removed any time in the future. The 14,000 books in the fire-damaged Brunswick Junior High School were covered with a heavy layer of soot, but were not water-damaged. They could be easily and relatively inexpensively trimmed and rebound. Documents too can be repaired at a future date. Sometimes the information contained in documents can be reproduced on new paper through photocopying methods (the copy preferably made on archival paper) and the original discarded, if the document itself has neither historical nor artifactual value.

Unfortunately, an emergency is not as easily handled if books and documents get wet. Wet, or even just damp, paper will support the growth of mold. Mold, in turn can stain and weaken paper at the point where it cannot be saved. If environmental conditions are right, mold will start to grow on damp or wet paper within 48 hours. Therefore, if collections are damp or wet, the salvage/treatment effort must go into full swing immediately.*

When to Air the Problem ... & When Not To

Wet paper can be air dried if the proper environmental conditions exist. *Damp* books, for example, can be easily dried if they are stood up on their tails, with the pages fanned open, in a space where the air is cool and dry, and where air circulation is good. *Wet* books can be treated similarly, but interleaved with absorbent paper such as unprinted newsprint, in order to facilitate the drying process. (Some conservators recommend impregnating the interleaving sheets with a fungicide, such as thymol dissolved in alcohol. Working with such chemicals in the amounts necessary for impregnation of a quantity of interleaving sheets is decidedly hazardous and should be avoided. If the interleaves are changed frequently, use of fungicide impregnated sheets should not be necessary.) Wet documents can be stacked up to five or six high, with absorbent paper between each sheet. Books should be fanned to new pages occasionally and documents shuffled so that exposure to air and uniform drying are assured. These steps should be taken as soon as possible following the disaster, so that mold does not set in. Air drying is ideally suited for emergencies involving small numbers of objects, when temperature and humidity are relatively low and conducive to drying.

Wet books can be packed in plastic milk crates and cartons in order to transport them to a freezer. The cartons interlock and can be stacked on pallets for ease in handling. (Photo, courtesy of Stanford University Library.)

Unfortunately, air drying is not always possible. Sometimes far too many objects are damaged or weather conditions are not suited to air drying. At those times, freezing and storing at low temperature (-20°F) is seen as a way to stabilize collections until drying becomes possible. This was the case at the Enid M. Baa Library, St. Thomas, Virgin Islands, where most of the large number of books and documents damaged during a flood were sent to a cold storage warehouse because the temperature and humidity in that tropical environment was so conducive to mold growth. A major flood at Stanford University in 1978 damaged 50,000 books. There was no possibility for limited staff working in limited space to air dry books under emergency conditions. Instead the books were wrapped, boxed, and sent to a cold storage warehouse until arrangements could be made for freeze-drying.

If freezing space is limited in the cold storage facility, priority should be given to objects which have already developed mold, leather and vellum bound volumes, manuscripts, works of art on paper, and materials on coated stock.

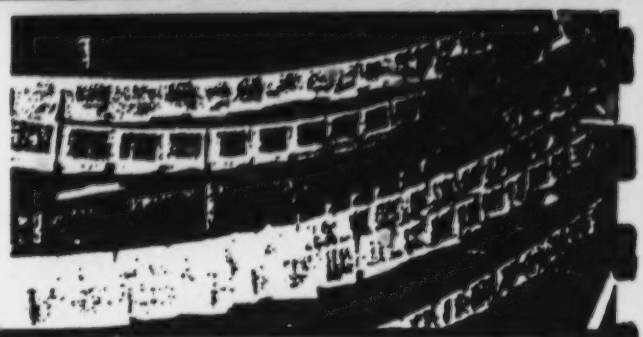
To Get the Environment in the Recovery Mode

One of the first objectives after the extent of damage has been evaluated is to restore appropriate environmental conditions inside the building, as quickly as possible. Obviously, it is important to protect collections from continued exposure to water. The assistance of electricians, carpenters, plumbers, janitors, and others will be needed in this effort, and, as previously stressed, this work will be carried out faster if those people have been located before the emergency. Roof repairs may be needed; windows broken during a hurricane may need replacement; and so on. A stockpiled supply of polyethylene sheeting will help to protect collections from water which may continue to drip on them.

At the same time, acceptable temperature and humidity conditions must be restored inside the building, so that mold growth is controlled. Humidity, naturally high after flooding,

*Much valuable technical information on this subject can be found in Peter Waters's excellent *Procedures for Salvage of Water-Damaged Library Materials*, now in its second revised edition, published by the Library of Congress in 1979. Information in this manual will supplement the technical instructions necessarily limited in this article.

Far left:
Bread trays provided convenient receptacles for drying documents that had been damaged by water from firemen's hoses. (Photo, courtesy of University of Baltimore, Langsdale Library.)
Left:
A staff member at Phillips Academy Library places documents on cafeteria trays to allow them to be air dried.
Right:
Drying of a large number of pamphlets was expedited by hanging them on lines which were temporarily strung up in the facility. (Photo, courtesy of Corning Museum of Glass.)



must be reduced so that even those collections which did not actually get wet will not get moldy. In winter, heat should be turned *down*, not up, since mold thrives in warm, damp places. In summer, air conditioning (if it is installed and operable) should be turned on to cool air and reduce humidity. If there is no air conditioning, windows should be opened, but only if conditions outside are cooler and drier than those inside the building. Dehumidifiers should be used to reduce moisture content in the air and electric fans used to dispel moist air. Wet carpets act like sponges, retaining moisture in the room; the water in the carpets must, at the very least, be extracted mechanically so that there is a chance of drying out the space. Wet carpeting and padding may need to be completely removed in order to dry a room that has been flooded.

Temperature and relative humidity should be monitored continually and an attempt should be made to reduce the temperature to below 68°F and relative humidity to below 55%, if possible. Removal of water-damaged collections to a drying area or to a freezer will serve to further reduce the moisture level in the room.

Putting Action on the Agenda

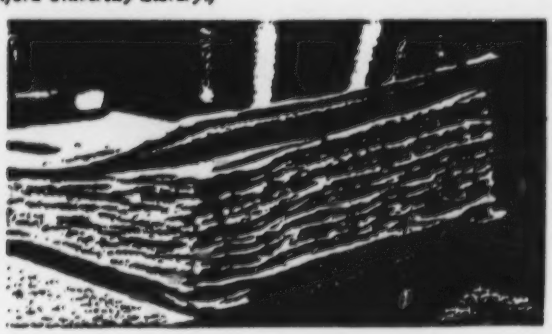
Once the extent of the damage is known and an attempt has been made to restore acceptable environmental conditions inside the building, then a plan of action should be formulated. A conservator's advice can prove very helpful in making strategical decisions. If collections are wet, the number of damaged objects and the degree of wetness often dictate the decision to air dry materials instead of freezing them. The College of the Atlantic in Maine chose to air dry 3,000 volumes in their recent fire because the books were only damp, not soaked, and the weather was cool and dry. Had the fire occurred in the middle of a heat wave, however, a decision to freeze those books might have been made instead, in order to stabilize them until drying conditions were better.

After a plan of action has been determined, emergency supplies should be obtained and other arrangements made. Plastic milk cartons needed for transporting wet books should be picked up from the supplier with whom previous arrangements should have been made. (Plastic cartons are better than cardboard cartons, which tend to fall apart when wet materials are placed in them.) A drying area (previously identified) will need to be equipped with electric fans and dehumidifiers (obtained, of course, from previously identified sources). In especially severe emergencies, portable generators also may be required. Trucks needed to transport materials either to the drying area or to the freezer must be called. The local cold storage warehouse must be alerted to the fact that a delivery of wet books is imminent later in the day. (Do not assume that space will always be available when you want it. It is prudent to identify a few local cold storage facilities. The salvage of ten truckloads of records following a fire at the State House Annex in Trenton, New Jersey, was temporarily stymied at this point when it was found that all cold storage warehouses in the area were filled to the brim with Thanksgiving turkeys! Freezer space was eventually located at a local military installation.)

The disaster team and volunteer helpers should be mobilized only after a recovery strategy has been clearly defined and when precise instructions can be conveyed to them. One common assignment for such workers following a library disaster, for example, is to comb the stacks, examining and touching each and every volume to see whether it is dry or wet. If wet, the books need to be removed by workers to a sorting/packing area. It is at this point that books which require special care can be identified. For example, books which are printed on coated paper can be irreversibly damaged if the pages become wet and then begin to dry. The sizing on these glossy pages fuses together, making the pages impossible to separate without tearing or cutting. All books on coated paper, i.e., most art and architecture books, should be routinely frozen until instructions for drying them can be obtained from a conservator.

Books which need to be transported to another location

Although these books are now dry, they exhibit damage due to the soaking they received during a flood. Left:Split vellum spine. Center: Loss of boards and spine. Right: Shape distortion. (Photos, courtesy of Stanford University Library.)



Books and documents have been wrapped and placed in a freezer for stabilization following a flood. (Photo, courtesy of Corning Museum of Glass.)

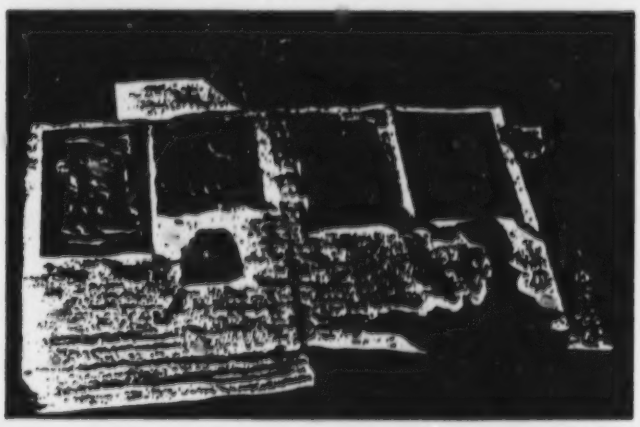
should be packed flat in plastic milk cartons. If the books are to be frozen, they should be separated from each other with a piece of wax paper or freezer wrap in order to keep them from sticking together. Plastic milk cartons have the advantage of interlocking and stacking easily on freezer pallets.

Documents may be sent to the freezer in boxes or file drawers, but there should be occasional interleaving every few inches with waxed paper or freezer wrap if possible, since thawing and drying of smaller blocks of frozen documents will be quicker than that of large blocks.

If air drying is undertaken, it should take place in a large clean space which has been cleared for the drying activity and where security is good. Conditions should be cool and dry, and air should be well circulated by electric fan, as indicated earlier. Conservators agree that keeping relative humidity between 40 and 55% is optimal.

Ingenuity sometimes pays off in the drying of certain types of library and archival materials. Small pamphlets, for example, have been dried successfully by hanging them on a fish line, while shallow plastic bakery trays have been used to dry documents.

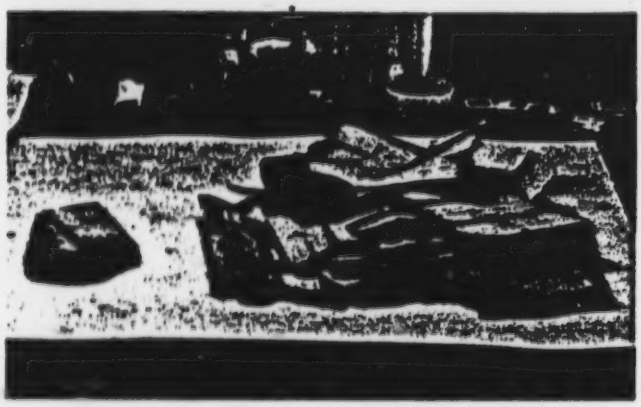
Oven drying of books should be avoided since it causes shrinkage and distortion of book covers and the text block.



Coated paper will fuse together when it begins to dry. If adequate steps are not taken to treat the wet material, permanent damage can result. (Photo, courtesy of Stanford University Library.)

All materials should be absolutely dry before they are removed from the drying era, since mold can grow if they are packed while still damp. Collections should be examined regularly during the year following their return to the repository to make sure that they stay free of mold. This is especially important if environmental conditions in the building are hot and humid year-round or in the summer. Library spaces and book stacks should be washed with disinfectant before collections are returned to them.

Books and documents that are frozen may be left frozen indefinitely. Their condition is stable. Eventually they can be dried in one of two ways. They can be thawed at room temperature and then air dried as described above. Alternatively, they can be sent to a commercial freeze-dry chamber for drying. There frozen books are dried by converting ice to vapor without the ice passing through the liquid state; the



Books charred in the great New York State Library fire of 1911 are now being treated.

vapor is drawn off. This technological improvement has proven highly successful for drying extremely large amounts of frozen materials. It does require special facilities, however, and is more expensive than other drying methods. This process is especially useful for manuscript collections (where soluble inks might dissolve if documents are allowed to thaw) and for books printed on coated paper (so that fusing of pages is avoided). Among the commercial freeze-drying/vacuum freeze-drying facilities in the United States are American Freeze-Dry, Inc., Audubon, New Jersey; Document Reprocessors of San Francisco; and McDonnell Aircraft Co., St. Louis, Missouri.

But problems are not over once the collections are dry. It is only then that physical damage to individual objects can be determined. Damage will have to be assessed, and repairs carried out as needed. Books, for example, may have lost their covers; others may be badly distorted. The cost of repair, rebinding, and/or restoration can be extremely high.

The recovery of collections following a disaster obviously can be difficult and costly under the best of circumstances. Those who have experienced even minor water or fire damage to library and archival materials or to works of art understand the importance of preventing disasters, if possible. They have also learned that forethought and planning can expedite the recovery effort enormously, should flooding or fire occur. These are lessons that all librarians and curators should take to heart by developing the most comprehensive disaster plans possible for the protection of their collections. ■

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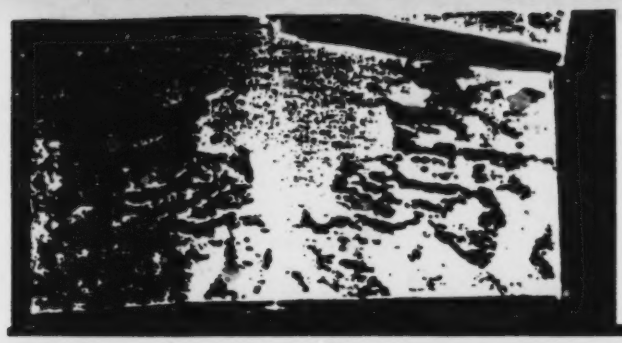

Mildewed paper resulting from delays in drying. (Photo, courtesy of Stanford University Library.)

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INTEGRATED PEST MANAGEMENT FOR LIBRARIES

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ABSTRACT

A library is, in effect, a concentration of foodstuffs for the common pests – insects, rodents, and mold – that attack the collections. The best control of pests is furnished by an integrated pest management program, *i.e.*, the use of a combination of control techniques. Insect damage to library materials is caused primarily by cockroaches (mainly the American, Oriental, and Australian cockroaches); silverfish (13 species are known in the United States); carpet beetles (the larvae of several species are damaging); cigarette beetles (the most common pest of herbarium collections); the drugstore beetle (sometimes called a "bookworm"); and psocids, or book lice. The common rodent found in libraries is the house mouse. Mold and mildew are large problems in libraries, particularly in subtropical and tropical climates. All of these infestations can be dealt with by the concerted use of various techniques, including external precautions to buildings, insect traps, the use of insecticides and other chemicals, control of moisture, cleanliness measures, limited heat treatment of infested materials, and continual inspection for evidence of infestations. Fumigation of library materials may be warranted in some instances, but is rarely necessary. A continual awareness of potential problems and immediate treatment are essential.

Man has come to realize that no one approach to pest prevention and control will suffice. Instead a combination of techniques is usually required to maximize the effectiveness of any pest control program. The term "integrated pest management" (IPM) has been coined to embody this concept: That all pest control programs must rely on several approaches working in concert to effect the desired result. An IPM approach must be considered when addressing the problems of pests in libraries.

A library, where books, printed materials, manuscripts, maps, prints, photographs, and archival materials are stored, perused, and exhibited is not unlike the setting in agriculture where huge quantities of foodstuffs are stored for long periods of time. The library is a concentration of foodstuffs, including starches, cellulose, and proteins, which forms a banquet for insects, rodents, and mold. In addition, the environment in which these foodstuffs are stored is indoors, protected from extremes of harsh climates. Populations of insects specific to this micro-environment can easily explode and cause serious damage if IPM approaches are not utilized fully to prevent such an occurrence.

In the course of 15 years of working with museums, libraries, collections, and historic properties in setting up IPM programs and addressing pest problems found in these situations, I have found damage to collections and structures inflicted by pests ranging from wood-destroying insects to woodpeckers. In such a short presentation, it is impossible to cover such a wide range of actual and potential pest problems. Even though it is not uncommon to find ethnographic and cultural material, decorative arts, religious material, artifacts, historical pieces, and works of art stored and exhibited in libraries, in this discussion of IPM approaches for libraries, the topics covered will be confined to the more traditional materials found in the libraries of the world.

The most common pests encountered in libraries are insects, rodents, and mold. Each of these pest problems will be reviewed, and the IPM approaches necessary for their control and prevention will be outlined.

Insects

Damage to library materials from insects is primarily caused by cockroaches, silverfish, various beetles, and book lice. Damage to these materials results when insects use them as a food source. Both immature and adult stages of cockroaches, silverfish, and book lice cause feeding damage on library materials. In the case of beetles, it is primarily the larval stage that is responsible for the feeding damage. The larvae chew their way through a book, ingest the material, and leave a tunnel filled with powdered excrement. Once the larvae have completed their development, they pupate, and the adult beetles emerge by chewing their way out. Small round exit holes are left in the book.

Cockroaches

Substantial damage to library materials can be attributed to various large species of cockroaches. These problems are more prevalent in the subtropical and tropical areas of the world, but damage can also be found in temperate climates.

Three cockroaches in particular are notable for the damage they do to library materials. They are the American cockroach, *Periplaneta americana* (Linn.); the Oriental cockroach, *Blatta orientalis* (Linn.); and the Australian cockroach, *Periplaneta australasiae* (Fabr.). These cockroaches have large, strong, chewing mouth parts, prefer starchy materials, and can easily destroy paper, paper products, bindings, and other coverings on books and pamphlets. Chewing damage is generally recognized by smears of fecal material in association with the damage and a ragged appearance to the areas that have been fed upon. These areas generally appear around the edges of the piece where small bits of paper have been removed and eaten. Sometimes pelletized droppings are also found in association with the feeding, particularly with the American cockroach.

The American cockroach (Figure 1) tends to hide in dark shaftways, basements, and false ceilings during the daytime, emerging at night to roam the library and feed on library materials. These cockroaches also regurgitate a brown liquid called attar, which is often smeared on the library materials. Attar acts as a chemical attractant for other American cockroaches. This cockroach is fully an inch and a half long with reddish brown wings and light markings on its thorax. It is cosmopolitan and prefers to live in warm moist places during the daytime. Favorite buildings of this cockroach are those that are heated with a steam heating system with boiler rooms and steam tunnels. It is also commonly found in sewer systems and will invade buildings through holes in manhole covers and sump pumps.

The female of this species forms an egg capsule which will be dropped or sometimes glued to surfaces. In time, nymphal cockroaches will emerge from the egg capsule. The young cockroaches will then go through a series of molts until reaching adulthood. This developmental process takes well over a year. Nymphal cockroaches are similar to the adults except they lack wings and sexual maturity. The life span of this species of cockroach from egg to death can last well over 2 years.

The Oriental cockroach (Figure 2) is a dark brown to black cockroach. The male's wings do not reach beyond the tip of the abdomen; the female is essentially wingless. The damage to library materials is similar to that of the American cockroach except that the Oriental cockroach does not produce pelletized excrement. This cockroach prefers to live in cool, moist places such as sewers, basements, around air-conditioning systems, and associated with water pipes and piping. Whereas the American cockroach will be found roaming on many floors of a building, the Oriental cockroach will generally be found on lower floors and horizontal surfaces because it lacks sticky pads

on its feet. The claws on the feet of all cockroaches, however, enable them to climb rough surfaces. Like the American cockroach, the Oriental cockroach is also notably gregarious. It is commonly known as the "water bug."

The life cycle of the Oriental cockroach is similar to that of the American cockroach with many molts from the time the nymphs hatch until adulthood. The life span is extremely long, well over 1 year, sometimes 2, and may even approach 3 years. The American cockroach female produces five times as many egg capsules as an Oriental cockroach female. The Oriental cockroach female does not glue her egg capsules, but drops them randomly.

The Australian cockroach (Figure 3) closely resembles the American cockroach, but can be distinguished from it by its slightly smaller size, the yellow margin on the thorax, and the light yellow streaks on the sides at the base of the wing covers. Older nymphal individuals of this species possess distinct bright yellow spots along the margins of their abdomen. Although this species is commonly found in more tropical regions of the world, it can be found indoors in heated buildings as far north as Canada. I have seen colonies in buildings in Pennsylvania and Idaho. It is common in greenhouses in various parts of North America.

Like the other two species, the Australian cockroach takes a long time to develop from egg to adult, generally, over 1 year. The female produces some 20-30 egg cases in her lifetime, with an average of 24 eggs per capsule. Like the American cockroach, it tends to prefer warm, moist environments.

Smaller cockroaches, such as the German cockroach, *Blattella germanica* (Linn.), and the Brown-Banded cockroach, *Supella longipalpa* (Serville), do not feed on library materials as a rule. They may, however, leave droppings resembling ground pepper on the materials. These droppings can usually be vacuumed up with a soft brush attachment and do not stain the materials.

The large species of cockroaches can be controlled by the following IPM measures.

1. Installation of a gravel 6-foot barrier around the perimeter of the library to prevent ingress from outdoors.
2. Elimination of all vines and ivy from the building.
3. Installation of proper screening on all windows and doors.
4. Installation of exterior lights away from the building so they will shine on the building from a distance rather than fastening them to the building so that insects are attracted to the exterior walls during the night.
5. Removal of all debris, leaves, and twigs around the exterior of the library as well as cleaning out debris from gutters on the roof of the building.
6. Elimination of cockroach harborages and entries by caulking and sealing.
7. Installation of sticky glueboards that will trap insects on their nightly forays around the library. These insect traps can be installed in false ceilings, basements, elevator shaftways, and closets so they intercept insects as they travel looking for food.
8. Whenever insect infestations are found, a common attempt at their control is by insecticidal treatments with an aerosol or fog. Insecticidal fogs or aerosols should never be used in any collection. Such formulations are normally oil-based. During application, small droplets of the oil/insecticide mixture are dispensed into the air, eventually settling on the entire collection. This kind of treatment irreversibly damages the collection.
9. The use of insect baits, such as 2 percent Baygon Cockroach Bait, applied sparingly to quiet zones of the interior of the library. This bait, which looks like

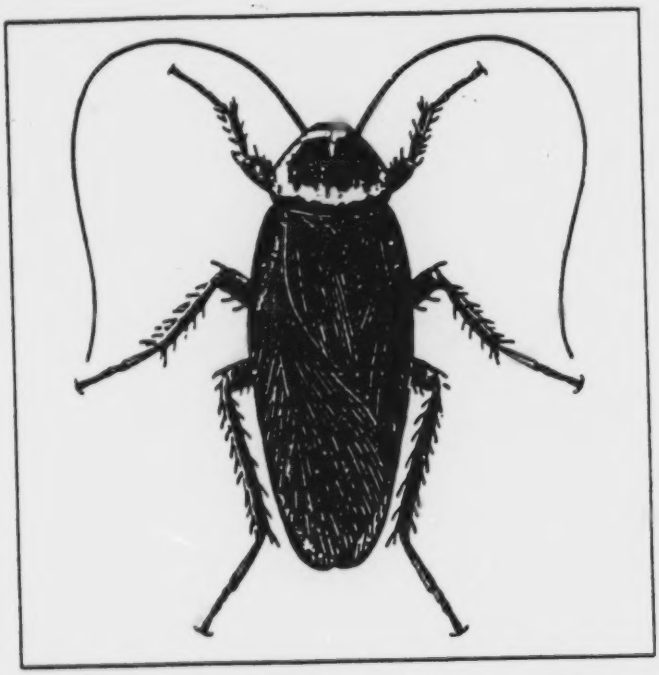

Fig. 1. The American cockroach, *Periplaneta americana* (Linn.). (Courtesy of Mallis *et al.*)

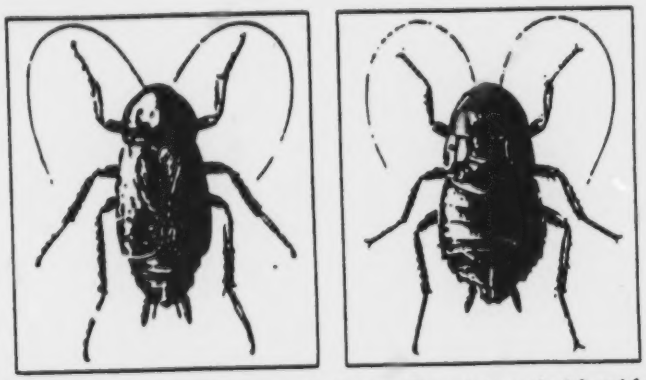

Fig. 2. The Oriental cockroach, *Blatta orientalis* (Linn.). The male is on the left and female on the right. Note the absence of developed wings in the female. (Courtesy of Mallis *et al.*)

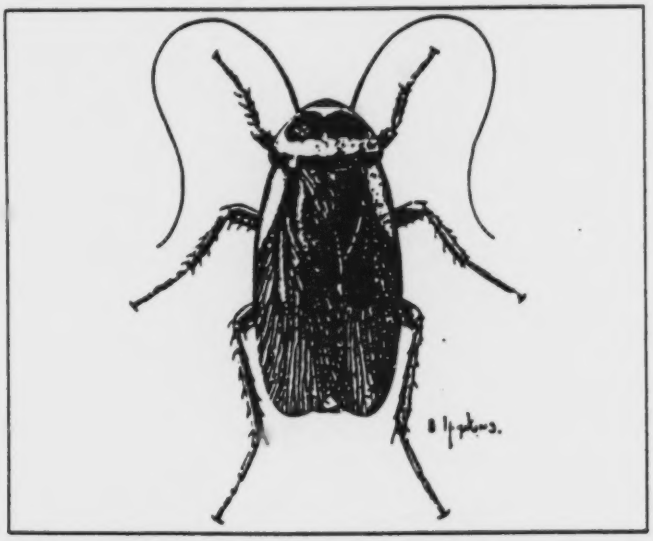

Fig. 3. The Australian cockroach, *Periplaneta australasiae* (Fabr.). The bright yellow "shoulders" on this species set it apart from the American cockroach. (Courtesy of Mallis *et al.*)

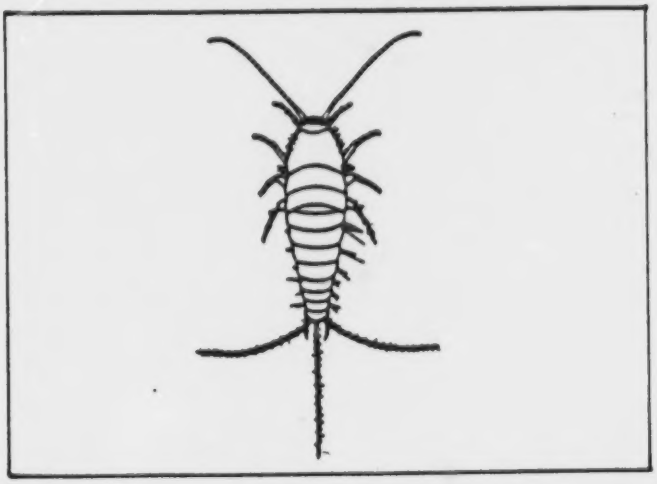

Fig. 4. A silverfish, *Lepisma saccharina* L. This species is one of the most common indoor pests of library materials. (Courtesy of Kingsolver and Pest Control in Museums.)

sawdust, is bran mixed with molasses and contains 2 percent Baygon. This bait is a favorite of large cockroaches and will easily bring populations into control.

10. Perimeter fan spraying with residual insecticides, paying particular attention to those areas adjacent to pipe chases, elevator shafts, storage areas, and mechanical rooms.
11. In the case of the American and Australian cockroaches, perimeter, exterior power-spraying of the walls and overhangs may be required.
12. Installation of thresholds and rubber flaps on exterior doors to prevent ingress by cockroaches from the exterior, particularly at night.
13. The use of steel wool in holes and openings leading from drainage and sewer systems to prevent cockroach ingress.

Silverfish

Silverfish (Figure 4) are one of the most common pests of libraries. All have weak, chewing-type mouth parts and tend to feed on products high in carbohydrates (starch) and proteins. Such materials as paper, paper sizing, prints, glue and paste, wallpaper, and drywall are favorites of silverfish. Damage from the feeding of silverfish can be recognized by certain areas that have been eaten all the way through and other areas that have only partially been eaten through. Silverfish tend to rasp their way slowly through a piece of paper, and it is this damage that is seen on library materials and prints. Silverfish will roam widely in search of foods, but once they have found a satisfactory source, they remain close to it.

There are many species of silverfish in the world; thirteen are known from the United States. Some prefer cool, moist environments, others warm and moist environments. They are small, tapered, wingless insects with long antennae and three long bristles protruding from their posterior end. They are nocturnal, resting in cracks and crevices during the daytime. When exposed to light, they move quickly to avoid it.

Silverfish are particularly fond of paper with a glaze on it. Often sizing, which may consist of starch, dextrin, casein, gum, and glue, is particularly attacked. Certain dyes are attractive to silverfish. Studies have shown that papers consisting of pure chemical pulp are more likely to be attacked than those consisting in part of mechanical pulp. In general, papers and books in regular use are not damaged by silverfish. Silverfish are also particularly fond of rayon and cellophane.

In temperate climates, silverfish tend to migrate vertically depending on the season of the year. In the hot months of summer, silverfish will migrate down into the cooler, more moist portions of the building, and in the fall and winter they will tend to migrate to attics and higher levels. Drying out a building with heat in the winter time will help to reduce silverfish populations. The heat also eliminates the microscopic mold that grows on plaster walls and drywall providing a food source for silverfish. In cool, moist basements, and commonly in poured-concrete buildings, silverfish are a year-round problem.

It is impossible to eliminate bringing silverfish into a library. Silverfish are a very common problem in cardboard box and drywall manufacturing facilities. Silverfish lay eggs in the corrugations of cardboard boxes, one of their favorite areas for egg deposition. With every cardboard box coming into a library, a new load of silverfish and their eggs is bound to arrive. Upon hatching, silverfish go through many molts throughout their lifetime and have a long life span.

Control and prevention of silverfish damage to library materials can be effected in a variety of ways.

1. Thorough vacuuming of the perimeters of rooms where silverfish like to hide underneath the toe moldings and baseboards during the daytime.
2. The use of insect sticky traps or glueboards in those areas where silverfish seem to be a problem. Each night, when silverfish are active, they will be trapped on the glueboards.
3. In cabinet storage situations, the use of silica gel in a finely powdered form in the void space beneath the bottom shelf or drawer of a cabinet. Sometimes the use of a 1/4-inch drill is necessary to gain access to apply this dust into the voids beneath the cabinets. Silica gel is a desiccant and kills silverfish by drying them out. By placing silica gel powder (sometimes in combination with pyrethrum insecticide) beneath the cabinets, there is virtually no way a silverfish can crawl up into the cabinet without encountering the silica gel thus being repelled or killed.
4. In some instances, particularly in manuscript, rare book, and print collections, the use of insecticide resin strips may be used in enclosed spaces. Insecticide resin strips contain the insecticide Vapona (DDVP). This material volatilizes from the resin strip and fills a confined space with molecules of insecticide. It is a mild fumigant and in time will kill all stages of insects within the enclosed space. The normal rate of application of these strips is one strip per thousand cubic feet of enclosed space (2). This type of chemical application is for enclosed spaces only, such as cabinets, vaults, and small storage rooms, and is not designed to be used in open, public spaces or where ventilation would carry the fumes out of the space.
5. Application of residual, liquid insecticidal sprays to perimeters of rooms and at the base of all stack shelving areas, paying particular attention to that crevice where the floor meets the wall, baseboards, and shelving.
6. The application of insecticidal dusts, such as a silica gel/pyrethrum combination, to voids where pipes enter walls and penetrate floors and in wall voids. In warmer parts of the world, construction engineers sometimes inject powdered silica gel in wall voids during construction of a building. This practice eliminates insect harborages.
7. Crack and crevice injection of small spot applications of liquid insecticides to the backs of cabinets where they are attached to walls.
8. The control and elimination of moisture such as leaky plumbing, around laundry areas, in bathrooms, and workrooms where a silverfish population can thrive because of the high moisture situation.
9. Reduction of potential sites of harborage by the use of caulking compounds and patching plasters.

Carpet Beetles

Carpet beetles belong to the family Dermestidae, which includes several species whose larvae damage library materials in storage. Except for one species known as the Odd Beetle, most of these beetles are small, round to oval, tiny beetles which are attracted to light (Figure 5). They may be found in light fixtures and on window sills. The primary source of food in libraries for the larvae of these beetles is dead insects. The larvae prefer materials high in protein, and carcasses of insects provide the total nutritional needs for many of these species. Once the larvae conclude their feeding on a dead insect or rodent, they pupate and emerge as adult flying beetles. The beetles seek out other proteinaceous materials on which to lay eggs.

Among traditional materials housed in libraries, probably the only places an adult beetle has to lay eggs in addition to carcasses, are tapestries, woolen goods, and the felt lining of storage boxes for rare books. If a library has an herbarium collection,

some species of carpet beetles will infest these collections. Rarely do the larvae of these insects attack leather-bound books. Thick, tanned leather does not appear to be attractive to them for feeding. Obviously, these beetles are a serious problem of museums and libraries where other animal-based, proteinaceous items are housed in addition to the traditional library materials.

Control of carpet beetles is not difficult provided the staff is involved in the IPM program. The following control measures can be employed.

1. Thorough vacuuming on a regular basis of all library areas, paying particular attention to the edges of the room where adults find dead insects on which to deposit their eggs. Annual inspection and vacuuming of false ceilings, attics, closets, maintenance areas, mechanical rooms, and elevator shaft pits are necessary to eliminate reservoirs of food sources and carpet beetle larvae.
2. Placement of sticky traps to intercept insects as they crawl into the library helps to keep carcasses of insects at a minimum. Keep in mind, however, that carpet beetles can fly into a sticky trap, lay eggs on a dead insect, and fly out of the trap without being trapped themselves. The larvae can proceed to devour the carcass of the insect on the sticky trap, pupate, emerge as an adult beetle, and fly out of the trap without being mired in the glue of the trap. This situation necessitates the removal of traps that have an accumulation of insects on a regular basis and replacement with a fresh trap.
3. Screening of all windows and doors to prevent ingress of adult beetles from the exterior of the building. Plantings of shrubbery around the building should not include plants whose flowers are white or blue and whose flowers contain high amounts of pollen. Crepe Myrtle and Spiraea are very attractive to adult carpet beetles, where they feed on pollen.
4. Elimination of all bird nests on and around the building. Carpet beetles become entrenched in such nests, feeding on dead birds, feathers, and other debris found in the nests.
5. The elimination of rodents and rodent nests for the reasons given above.
6. The use of residual sprays may help to some extent for carpet beetle control, but is usually of little value, particularly in warm, humid climates.
7. The use of Vapona resin strips in vaults, closets, and enclosed storage spaces is a valuable technique for eliminating all stages of carpet beetles within these spaces.

Cigarette Beetle

The Cigarette Beetle, *Lasioderma serricorne* (F.) (Figure 6) is a small, round, cinnamon-colored flying beetle whose larvae infest dried leafy materials, such as tobacco and tobacco products, spices, corn husk dolls, dried flowers, and books. This beetle, whose head is tucked under at a right angle to its body, is found throughout the world. It is the most common pest of herbarium collections and is often called the "Herbarium Beetle."

The female of this beetle lays approximately 30 eggs over a period of 3 weeks. The larvae are small and grublike and complete their development in from 5 to 10 weeks. The entire life span is from 70 to 90 days with five to six overlapping generations per year in warm localities, but only one generation in more temperate regions. The adult beetles are strong flyers in subdued light.

This beetle is one of two commonly known as the bookworm. Eggs are laid on the spine of the book and along the edges of the cover. Upon hatching, the larvae tunnel immediately beneath the covering of the book to eat the glue on the spine and under the cover. After feeding on the glue for a period of time and tunneling for

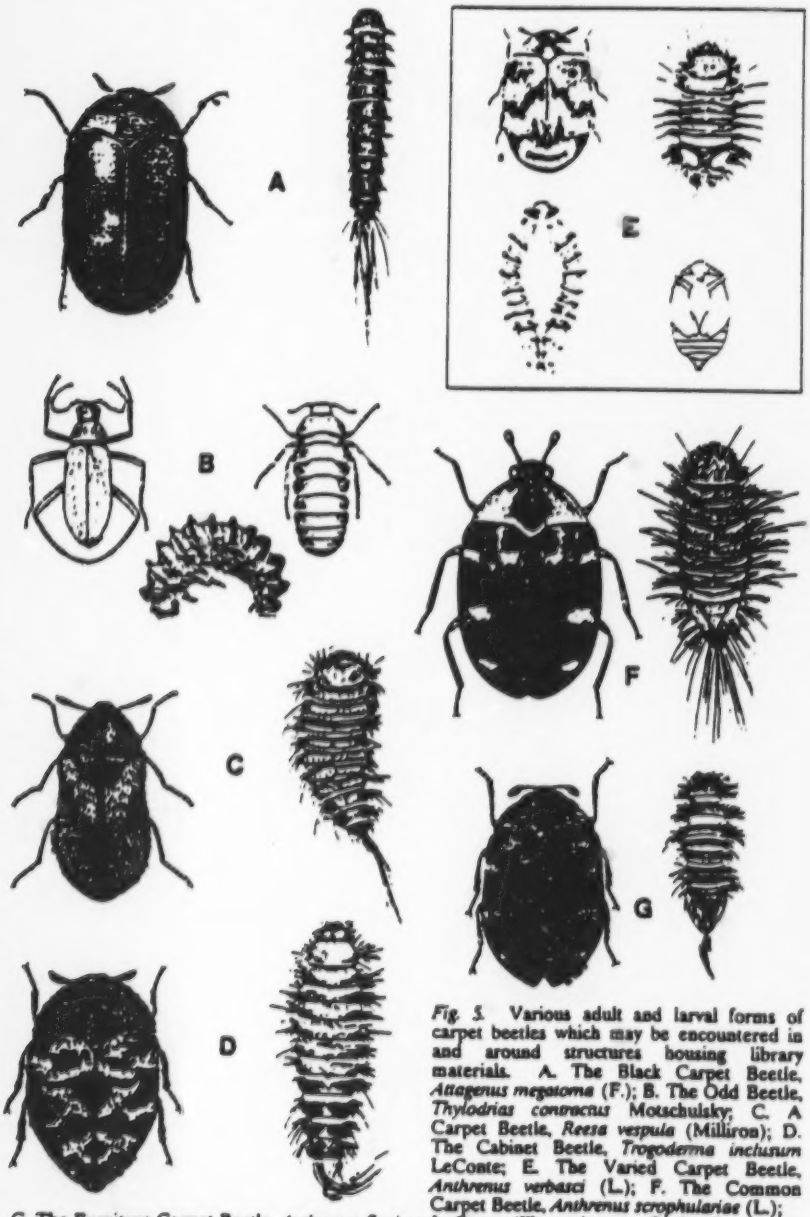

Fig. 5. Various adult and larval forms of carpet beetles which may be encountered in and around structures housing library materials. A. The Black Carpet Beetle, *Attagenus megatoma* (F.); B. The Odd Beetle, *Thylodrias contractus* Motschulsky; C. A Carpet Beetle, *Reesa vespula* (Milliron); D. The Cabinet Beetle, *Trogoderma inclusum* LeConte; E. The Varied Carpet Beetle, *Anthrenus verbasci* (L.); F. The Common Carpet Beetle, *Anthrenus scrophulariae* (L.); G. The Furniture Carpet Beetle, *Anthrenus flavipes* LeConte. (Illustrations A - D plus G, courtesy of Kingsolver and Pest Control in Museums. Illustrations E and F, courtesy of Mallis *et al.*)

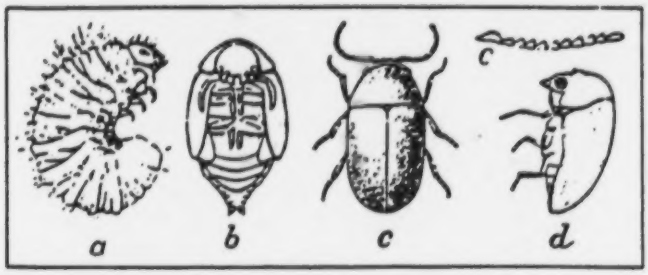

Fig. 6. The Cigarette Beetle, *Lasioderma sericorne* (F.). Note how the head of the adult beetle is tucked down at a right angle to the axis of the body. (Courtesy of Mallis *et al.*)

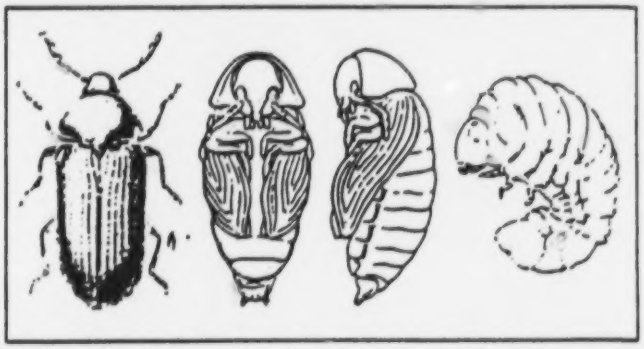

Fig. 7. The Drugstore Beetle, *Stegobium paniceum* (L.). The striations on the wing covers are a distinguishing feature of this species. (Courtesy of Mallis, *et al.*)

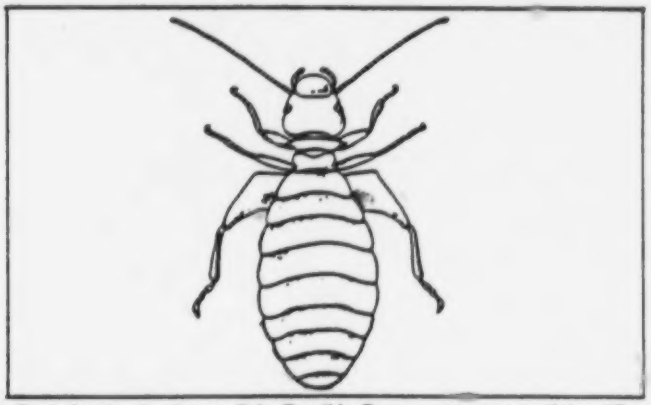

Fig. 8. A Book Louse, the Larger Pale Trogiid, *Trogium pulsatorium* (L.). (Courtesy of Kingsolver and Pest Control in Museums.)

approximately 3-4 inches, the larvae will pupate and emerge as an adult beetle, leaving a round hole upon exiting. Generally, fine powder is found in association with the holes, the powder being the color of the book cover in which the feeding has occurred. These piles of colored powder are easily detectable by inspecting the shelving with a flashlight.

The control of cigarette beetles in a library can be effected with a combination of approaches.

1. Screen all entries from the exterior to prevent beetles from flying into the building.
2. Do not allow dried flower arrangements to be in the open in the library. Often eggs and larvae are imported into the library on dried flower arrangements. The larvae will consume the dried vegetable matter of the arrangement as well as the glue that generally holds the flower arrangement together.
3. Do not allow the storage of spices or other leafy vegetable matter in the library. Cigarette beetles are particularly fond of red spices, such as cayenne, paprika, and chili powder.
4. Do not encourage the storage or display of botanical collections in the library. If a collection is to be stored or exhibited within a library, it should be disinfected with heat to kill all stages of cigarette beetles in the sheaves of botanical specimens. By heating the collection to 130° F for 3 hours, all stages of insects will be killed. After this treatment, stored collections should be housed in cabinetry with Vapona resin strips to prevent possible reinfestations. Botanical specimens should be displayed within Plexiglas enclosures to keep insects out.
5. To disinfest an entire structure of insects, heating the space with commercial gas burners has been successful in the past. By using electric fans to distribute the heat throughout the building, all insect stages can be killed by maintaining a temperature of 140° F (60°-63° C) for 6 hours. It is helpful to loosen the books and materials to allow the air to circulate around them. This technique not only controls cigarette beetles in books, but all stages of insects in the entire structure (3).
6. By using plants that are preferred by gravid female cigarette beetles, infestations can be controlled. These bug traps, such as whole leaf tobacco, can be placed in strategic locations in the library. As the plant traps become infested with eggs and larvae, they can be removed and burned, before the larvae have a chance to pupate and emerge as adult beetles (4).
7. If a localized, limited infestation is found in a library, isolate the infected books and subject them to a heat treatment. By placing the books in a standard oven at the lowest temperature possible (130° for 3 hours), and placing wet newspaper or a pan of water in the bottom of the oven to maintain humidity inside the oven chamber, all stages of this insect, and in fact any insect, will be killed. This technique is commonly used in herbarium collections in various parts of the world. It is much easier to kill all stages of insects with heat than it is by freezing. By supplying a source of humidity in the chamber, the books should not dry out during this treatment. Only active infestations should be treated in this manner. Dark exit holes, showing no powder associated with them, indicate that the infestation has long since died out and does not require treatment.
8. If a library has an active bindery, sometimes it is possible to mix a pesticide with the glue as the damaged books are bound. In some parts of the world, the insecticide dieldrin is used for this purpose. A cigarette beetle larva consuming

some of the glue would then be killed before it has a chance to develop and emerge as an adult beetle.

Drugstore Beetle

The Drugstore Beetle, *Stegobium paniceum* (L.) (Figure 7) may infest books and manuscripts and is sometimes called a "bookworm." Where the cigarette beetle tends to confine its larval feeding to the spine and glue that holds the book together, the drugstore beetle larvae often tunnel through the pages of the book, as well as emerging through the cover and spine. This type of infestation may be found in storage areas of libraries that tend to be moist. Active infestations are a real threat to books and should be dealt with quickly. Again, only those books showing small, round exit holes, associated with powder drifting onto the books and shelving, should be treated. Small, round, dark exit holes from older books, particularly pre-19th century books, that show no powder associated with the holes are not active infestations and nothing need be done to them.

Eggs of the drugstore beetle are laid singly on the books, instead of in a mass. The larval period ranges from 4 to 5 months. Generally 7 months are required to complete the life cycle from egg to adult in a temperate climate. In warmer climates four broods per year are possible.

In addition to the IPM measures listed for the cigarette beetle, the following IPM approaches can be used to control the drugstore beetle.

1. Screen all windows and doors to prevent ingress from the exterior.
2. Caulk around all windows to prevent ingress into the building.
3. Eliminate pigeons' nests from the building. In one instance, drugstore beetles were emerging from pigeon nest debris and gaining access to a library through loose-fitting windows. The larvae of the drugstore beetles were feeding on undigested grain and other food products found in the manure layers of the pigeon nests.
4. Books infested with drugstore beetles can be disinfested by the use of humidified heat at 130° F for a period of 3 hours as explained more fully in the section dealing with the cigarette beetle.
5. The incorporation of an insecticide in the glue at a bindery may have a limited effect on controlling infestations of drugstore beetles in books. When cigarette beetles infest books, their primary diet is the glue of the binding, hence they may be controlled by incorporating insecticide in the glue. Drugstore beetle larvae, however, tunnel directly into the interior of the book, feeding on pages. Because they ingest such small amounts of glue in their feeding activities, the larvae and adults of the drugstore beetle will generally not be killed by the incorporation of an insecticide in the glue.
6. The use of fans to keep air circulating in the stacks and to keep the books dried out is an aid in controlling infestations. Attempt to keep the relative humidity between 50 and 60 percent at all times.
7. Regular inspection of the stacks with a flashlight will enable the librarian to pinpoint areas of infestation by locating the piles of fine powder drifting from the books onto the shelving.

Psocids

Psocids (Figure 8), or book lice as they are commonly known, are small, wingless, soft-bodied insects that are very hard to see with the naked eye. Psocids are a common pest of paper materials, where they feed on microscopic mold growing on the pages. Except for the spot they may leave when crushed in a book, they do no damage to the book

itself. Several species are found in libraries across the world. Psocids are not a threat to collections, but are an indicator of high humidity and moist conditions.

Book lice are parthenogenetic, that is, females can reproduce without the sperm from a male. After the eggs hatch, there are generally four molts until the small nymph reaches adulthood. The life cycle averages 110 days. In warmer regions of the world, life cycles are speeded up to as many as 15 generations per year. During cold weather the adults die, leaving eggs to hatch in the spring.

Psocids prefer damp, warm, undisturbed situations. In temperate climates they become most numerous during the spring and summer. Heated buildings in temperate climates reduce the dampness and fungi upon which book lice feed. In addition to mold, book lice have been known to feed on cereals and materials of a starchy nature. Book lice are of prime concern in newly constructed buildings. Insulation, hollow walls, and wrapping around pipes and electrical fixtures incorporate moisture that is not readily evaporated and which promotes mold growth on which book lice feed.

Control of book lice is difficult. Several approaches must be considered.

1. In enclosed spaces, psocids may be controlled with the use of Vapona resin strips.
2. Lowering the moisture in materials and in the room will help control psocids by preventing mold growth. The use of fans and climatic controls to keep the relative humidities within a range of 50-60 percent and temperatures from 68° to 72° F will aid in reducing psocid populations.
3. For archival materials in "dead storage," placing the material in a large polyethylene plastic bag with several cups of dried, powdered silica gel wrapped in muslin or cheese cloth will help lower the moisture within the bag to the point where mold will not grow and psocids will be eliminated.
4. With heavily infested, moldy books, paradichlorobenzene (PDB) may be used as a fumigant to control book lice. A very tightly confined space must be used, such as a weather-stripped cabinet or closet or a heavy-duty polyethylene bag and sufficient quantities of PDB crystals to obtain air concentrations that will effectively kill the insects. A rate of 1 pound of crystals per 100 cubic feet of space for a period of at least 2 weeks is the minimum necessary for a complete kill. Paradichlorobenzene used in this manner will also kill surface mold and spores on the materials. After the fumigation, the materials should be aired thoroughly.

Rodents

The most common rodent found in libraries is the **House Mouse**, *Mus musculus* (Figure 9). This species seems to be able to invade practically any structure man has made. Damage to library materials comes from mice destroying materials for nesting purposes, and urinating and defecating on library materials. Populations of mice can build up very quickly, and when they die, their carcasses act as a source of food for carpet beetles. In addition to damaging collections directly, mice may chew the insulation off electrical wires, causing them to short and start a fire.

House mice are secretive and are generally active at night. They live in a territory with a small home range. The average distance that a mouse travels in its activities is 12 feet. Male mice are highly territorial, and for this reason control measures must be designed for specific areas where mouse droppings are found. Glueboards and traps should be set in these areas. House mice live outdoors year around, but will invade buildings, particularly in the fall of the year in temperate climates.

Mice are sexually mature in 35 days. The average litter size is about six. A female can have another litter approximately every 50 days. Community nests of mice, where several females may share the nest with their accumulated brood, are not uncommon.

Fig. 9. The House Mouse, *Mus musculus* (Linn.). (Courtesy of Mallis *et al.*)

They breed throughout the year indoors. Mice living outdoors are seasonal breeders, peaking in the spring and the fall.

Mice feed on a variety of foods provided by man. They also feed on dead insects found indoors. Mice have been found to be cannibalistic. They apparently do not need free water to drink, but will consume it if it is available. Mice feeding on high protein diets must supplement their diets with free liquid.

During their nocturnal activity, mice leave fecal droppings wherever they have been active. Other signs of mouse infestation are gnaw marks; small, stained holes in floors and walls, and beneath doors; and a pungent odor from their urine.

Mouse control in a library is important and should be dealt with in the following ways.

1. Seal the building on the exterior as tightly as possible with steel wool and caulking compounds.
2. Never use a toxic baiting program for mice on the interior of a library. The mice will die in the walls, floors, and ceilings, and provide food for carpet beetles.
3. Use mechanical control techniques for mouse control. Snap traps baited with cotton balls or peanut butter can be used to trap mice. Multiple-catch live traps are available on the market, such as the "Ketch-all" trap. These are capable of catching more than one mouse at a time without the use of bait, relying on the innate curiosity of the mouse. Glueboards can also be used to trap mice. Soon after they are trapped they will die, and the trap or glue board can be discarded.
4. A thorough inspection of the building with a flashlight on a periodic basis is important to identify those areas where mice activity is present. The presence of droppings is a clear indication that control measures should be undertaken in that exact spot. Two or three weeks after a control program has been instituted, remove all droppings so the progress of the trapping program can be determined.
5. In temperate regions, in late summer and early fall, trapping programs should be instituted so they will be in place when the mice naturally tend to invade structures.
6. Sonic devices aimed at rodent elimination are of questionable value in most library mouse control programs.

Mold and Mildew

One large problem in libraries, particularly in subtropical and tropical climates, is the presence of mold on library materials. Mold results from spores landing on a substrate that has the correct temperature and surrounding humidity to initiate germination of the spores. When the spores germinate, they put out fine strands of mycelia, which invade the substrate, utilizing it as a food source. The mold mycelia exude liquids that dissolve the substrate, and this food is then used in the production of more mycelia and eventually millions of spores.

In order for this scenario to take place on paper products, books, and other library materials, prolonged periods of high humidity are required for mold growth. If the environment of a library is held at a temperature of from 68° F to 72° F and a relative humidity of 50 percent to 60 percent, mold will not be seen. This is not to say that some spores will not germinate. It simply means that after germinating, the mycelia will not have conditions suitable for growth and will die before being visible to the naked eye.

When the relative humidity of the environment remains in the 60 percent to 70 percent range, certain kinds of mold spores will germinate, but most will be unable to maintain mycelial growth and will collapse. This higher humidity range is not as "safe" for paper products, because there will tend to be micro-environments in the library where humidities will peak higher than the overall relative humidity for the entire structure and may create conditions conducive to localized mold growth. Of course, higher temperatures under these higher humidities will also enhance the possibility of localized mold growth on library materials.

When the relative humidity of a library exceeds 75 percent and remains in this range for a period of time, serious mold problems will result on library materials. Even if temperatures are low, the effects of the high humidity will stimulate spores to germinate en masse. Not only will spores germinate, but growth of the resultant mycelia will be quick and unabated. In as short a time as 36 hours, mycelial mats will begin to appear on the materials and spread outward. Soon the center of the mat will begin to appear dark, generating millions of spores. The key to long-term mold control, then, is to manage the moisture in the air of the library and stacks in a manner that will minimize periods of high humidity.

Each cubic foot of air contains thousands of mold spores which land on surfaces and objects in the library every day. Attempts to control mold on library materials by using various chemicals therefore are usually ineffective. Chemicals such as thymol, ortho phenylphenol (OPP), alcohol, and diluted bleach solutions kill some of the mold spores on the surface as well as some of the mycelia. As soon as these chemicals have volatilized from the surface, the object is vulnerable to new mold spores landing on the surface. If the conditions are correct, germination and production of more mold will result. These types of chemicals do not impart residual control for mold or the mold spores.

Similarly, fumigation with poisonous gases in a chamber does not impart any residual mold control effects. Much of the fumigation that is done in libraries is not warranted. Changing the environment that produced the conditions suitable for mold growth in the first place is the only truly effective means of retarding and eliminating mold growth. If a spore lands on a substrate that is not suitable for growth, in time the spore will desiccate and die. As long as the conditions of the substrate and surrounding micro-environment are not suitable for spore germination, the spores will not germinate and mold will never appear.

Some considerations in handling mold and mildew in libraries follow.

1. An air handling system should be installed that will lower the humidity in the air and then reheat the air to desired levels. This system should be designed to handle incoming outside air as well as recirculated air. Such systems must be carefully thought out and must be large enough to accept incoming loads with humidity levels of the exterior air as well as the amount of moisture contained in the interior air. The aim is to maintain an interior environment in the library of from 50 to 60 percent relative humidity and 68° to 72° F at all times.
2. If such air handling systems are not available or cannot be installed, fans can be used to keep the air moving, particularly near outside walls and close to floor levels, in an attempt to lower moisture content of library materials.
3. Waterproofing basements and walls below grade on the exterior to prevent moisture from wicking through the walls and into the interior will aid in keeping humidity levels down inside the building.
4. Earthen floors in basements and sub-basements should be sealed with concrete to prevent moisture from wicking up into the building. At the very least, earthen floors should be covered with 4-6 mil polyethylene film to lessen the amount of moisture being volatilized into the interior air.
5. Water-sealant paints can be applied to floors and walls to prevent ingress of moisture into the interior of the building.
6. Attic vents and fans can be installed to pull air through buildings that have no air handling systems and where tropical climates require windows to be opened throughout the year. With such installations air can at least be kept moving throughout the building.
7. Open trenches and drains in mechanical rooms and areas adjacent to stack areas should be covered to prevent evaporation of liquid into the interior space.
8. Except for drinking fountains, interior fountains or waterfalls should not be permitted in a library.
9. Do not allow indoor planted areas in a library. Keep ornamental and hanging plants to a minimum to reduce the amount of water released into the interior air.
10. Heavy mold infestations resulting from flooding, water damage, leaks, and fires is an entirely separate topic and cannot be dealt with within the scope of this paper.
11. Regular inspection of the collections with a flashlight to pinpoint trouble areas is a necessity. Localized infestations of mold can be temporarily arrested with topical applications of chemicals until other modifications can be made.
12. Thymol is commonly used as a temporary mold-control chemical on books, paper, and other library materials. The use of thymol, either as a mist or spray, or as a fumigant volatilized by heat, does not impart residual mold control to the library materials. Thymol will kill some species of mold spores and mycelia upon contact. Taking the materials out of the atmosphere of thymol will leave them vulnerable to mold spore deposition and possible germination.

In the United States, thymol is not registered as a mold-control chemical with the Environmental Protection Agency. It is often used, however, by library technicians and museum conservators. A wet mist can be applied by dissolving thymol crystals in ethyl alcohol (ethanol). A 1 percent finished dilution is normally used. The technician should wear a respirator approved for organic chemicals as well as goggles when using thymol. To protect from dermal irritation, the technician should also wear rubber gloves.

Some institutions have designed small chambers for the use of thymol for fumigation. Thymol crystals are placed on a metal tray and heated with several light

bulbs. The space within the enclosed chamber becomes saturated with thymol molecules, fumigating the materials in this space. The same precautions apply for the operator as previously discussed. Goods fumigated in such a way should be aerated thoroughly in a fume hood or outdoors to volatilize any remaining thymol before the materials can be safely handled. As stated previously, after the materials have been aerated, there will be no thymol left on the materials to provide protection against subsequent mold development.

Paradichlorobenzene (PDB) can be used in an enclosed space as a mild fumigant for mold control. Where a thymol fumigation takes no more than 24 hours for the application phase, a PDB fumigation would take up to 3 weeks unless the crystals were volatilized by heat. As before, PDB does not give residual mold control to the library materials.

Ortho phenylphenol (OPP) is another phenolic chemical that has been used for non-residual mold control on library materials. This chemical is not registered for use for mold control in libraries in the United States, but has been used in the past for extensive mold infestations brought about by flooding and fires. Repeated applications of the diluted material in alcohol are made by spraying or fogging this solution onto the library materials. Repeated applications are made over a series of days. These types of applications are usually performed by professional pest control operators or those who are thoroughly trained in the use of this chemical.

Alcohol and dilute bleach solutions have been used by technicians for spot applications to library materials, shelving, walls, and floors. Any strong oxidizing agent will kill mold spores, but most will not impart residual chemical control.

Fumigation

Fumigation of library materials with extremely toxic chemicals is rarely necessary. It may be warranted when dealing with bookworms, but fumigation is generally not warranted when dealing with mold and mildew problems. Historically, the library community has used ethylene oxide in fumigation chambers for mold and mildew control on incoming library materials. As was stressed in the section on mold, fumigation will not control mold and mildew if the library materials are placed back into the same conditions from which they came. In most instances library materials that have been fumigated are then stored in areas which do not have an environment conducive to mold growth. The success of the fumigation is given as a reason for the control of the mold and mildew, when, in fact, the new area in which the materials are stored is the governing factor in the mold and mildew control.

Ethylene oxide, either in combination with Freon or carbon dioxide, has been found to be a carcinogenic material. In the United States a chamber may have no more than 1 part per million (ppm) of ethylene oxide left after the aeration and before the materials can be removed safely. One of the major problems with ethylene oxide is that very few chambers in the world meet this requirement. Any fumigation chamber relying on an air wash system to aerate the goods after a fumigation has been completed usually will not reach levels of 1 ppm or below at the end of the air wash cycles.

An air wash cycle is a term coined by the manufacturers of chambers to mean one complete cycle of "air washing" of the goods inside the chamber after exposure to a toxic gas. At the end of the exposure phase, the chamber is under vacuum. The operator, either manually or electronically, allows fresh air to come into the chamber. Another vacuum is then drawn, removing some of the toxic air by expelling it to the atmosphere. After a vacuum has been drawn, fresh air once again is allowed to rush

into the chamber. Then another vacuum is drawn and this contaminated air is once again expelled into the atmosphere. This series of alternating between pulling a vacuum and allowing fresh air to rush into the chamber is termed an air wash cycle. Most chambers are set up in such a manner as to allow for up to five total air washes before the electronics must be reset.

After such a limited number of air wash cycles, it is rare to find a chamber that meets the current standard of 1 ppm. Studies have shown that in some chambers, after 75 air wash cycles, 4 ppm ethylene oxide still remained in the chamber. In designing, modifying, and testing chambers, I find it difficult, if not impossible, to reach such low levels without a flow-through ventilation system. Even with such a system, depending on the materials being fumigated, 1 ppm or below is difficult to obtain with ethylene oxide.

Ethylene oxide is soluble in oils, fats, and lipids, making leather-bound books retain ethylene oxide for long periods of time after fumigation. After bringing books out of a chamber, they will volatilize ethylene oxide into the air for varying periods of time up to and exceeding 3 months. It is therefore critical that the managers of major libraries test in-house chambers and study fumigation policies and procedures to determine if they are meeting current requirements. Most will find that fumigation chamber modifications and procedural changes are required to meet current standards.

Other fumigants, such as methyl bromide, hydrogen sulfide, and some of the liquid fumigants, are not generally acceptable for library materials for several reasons. Methyl bromide sometimes chemically reacts with materials high in sulfur. If this chemical reaction were to take place, mercaptans would be formed and would create an irreversible, foul-smelling odor. Hydrogen sulfide is explosive and dangerous to use. Some of the liquid fumigants have been found to be carcinogenic.

Recently in the United States, Vikane (sulfuryl fluoride), manufactured by Dow Chemical Company, has been registered for use in chambers as a fumigant. As with all fumigants, this material does not impart any residual control, but can effectively penetrate dense materials, such as library materials, and will kill all stages of insects. One problem with Vikane is that it is a poor ovicide, and therefore dosages must be increased in order to penetrate the eggs of certain species of insects. To date, this material has been found to be very nonreactive with materials and is commonly used as a structural fumigant in wood-destroying insect control. Its use to control mold spores and mycelia remains in debate.

Conclusion

As is true with all museum materials, one cannot delay treatment until insects, rodents, and mold have turned the library collections into a food source. We must be keenly aware of what is happening in our collections and structures. We must anticipate the types of problems unique to libraries and provide an integrated pest management plan to deal immediately with those problems present and to prevent others from arising. In this way, we will establish the most common sense approaches to pest prevention and control with the least impact on our environment and ourselves from toxic chemicals

References and Notes

1. Dr. Parker, an entomologist, is a consultant to museums, historic properties and libraries, specializing in IPM approaches. He is President of Pest Control Services, Inc., 14 East Stratford Avenue, Lansdowne, Pennsylvania, USA, 19050. Telephone (215) 284-6249

2. The No-Pest Strip is the only dry strip available on the market today. It is available through Kenco Chemical Company, P. O. Box 6246, Jacksonville, Florida, U.S.A., 32236. Telephone (800) 523-3685.
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ZUSAMMENFASSUNG - Eine Bibliothek ist in der Tat eine Konzentrierung von allgemein auftretenden Schädlingen - Insekten, Nagetieren und Schimmel - die die Sammlungen angreifen. Ein integriertes Schädlingsbekämpfungs- und Vorbeugeprogramm, *i.e.* der Einsatz einer Kombination verschiedener Techniken, bietet die beste Eindämmung für Schädlinge. Insektenschaden an Bibliotheksmaterial wird hauptsächlich durch Schaben (vor allem amerikanische, orientalische und australische Schaben), Silberfische (von denen 13 Arten in den Vereinigten Staaten bekannt sind), Teppichkäfer (deren Larven verschiedener Arten zerstörend wirken), Zigarettenkäfer (den am häufigsten auftretenden Schadlingen in Herbariumsammlungen), den Kabinettkäfer (manchmal auch "Bücherwurm" genannt) und Psokopteren oder Bücherläuse hervorgerufen. Das gemeine Nagetier, das in Bibliotheken vorzufinden ist, ist die Hausmaus. Schimmel und Mehltau stellen grosse Probleme in Bibliotheken, vor allem in subtropischen und tropischen Klimaten dar. Durch den konzertierten Einsatz verschiedener Techniken kann mit den verschiedenen Arten des Befalls umgegangen werden. Zu diesen Techniken gehören externe Vorbeugemassnahmen an Gebäuden, Insektenfallen, der Gebrauch von Schadlingsbekamfungsmitteln und anderen Chemikalien, Feuchtigkeitskontrolle, Reinigungsmassnahmen, begrenzte Warmebehandlung von befallenem Material und standige Kontrolle bei Nachweis von Befall. Die Begasung von Bibliotheksmaterial kann in einigen Fällen berechtigt sein, ist aber selten notwendig. Standiges Bewusstsein dessen, dass potentielle Probleme vorhanden und Sofortmassnahmen notwendig sind, muss vorhanden sein.

RESUME - Une bibliothèque est, de fait, un centre d'alimentation pour les parasites de type commun nuisant aux documents rassemblés: insectes, rongeurs, moisissure. Le meilleur moyen de lutter contre ces parasites consiste dans des programmes intégrés de lutte, dont l'utilisation combinée de différentes techniques. Les dommages d'insectes aux documents de bibliothèque sont provoqués tout d'abord par les cafards (par ordre de gravité: américain, oriental, australien); mille-pattes argenté (espèces connues aux Etats-Unis); cafards de tapis (leurs larves sont particulièrement dangereuses); cafards cigarette (l'insecte trouvé le plus fréquemment); le cafard simplex (aussi appellé ver de bibliothèque) et le psocide ou pou du livre. Le rongeur le plus souvent trouvé dans les bibliothèques est la souris domestique. Les moisissures et le mildiou représentent des problèmes importants en bibliothèque, tout particulièrement dans des climats tropicaux ou sous-tropicaux. Toutes ces infestations peuvent être traitées par l'application combinée de diverses techniques dont la protection extérieure des bâtiments, les pièges à insectes, l'utilisation d'insecticides et autres produits chimiques, des moyens de contrôle de l'humidité, des mesures d'hygiène, traitement restreint des documents touchés et inspections continues pour

dépister d'éventuelles infestations. La fumigation de documents pourra être autorisée dans quelques cas mais elle est rarement nécessaire. Une prise de conscience constante des problèmes éventuels ainsi qu'un traitement immédiat, le cas échéant, sont deux éléments d'importance cruciale.

THE SPORE INVADES AND BEGINS TO GROW. NOW WHAT?

by Lois Olcott Price
SAA Annual Meeting, September 1991

IS IT REALLY MOLD?

Accumulations of dirt, dust, stains and cobwebs can be mistaken for mold. If it is mold, is it alive and florishing or dry and dormant?

- --Check temperature and humidity in affected area. Mold will only grow if humidity is over 65%.
- --Does material feel damp? Smell moldy?
- --Check under magnification. Does it look like mold?
- --Test with brush. Is it dry and powdery or soft and smeary?

IS IT A MINOR OUTBREAK OR A MAJOR BLOOM?

Small outbreaks involving a limited number of items can usually be handled in-house. A major bloom involving a large area of the collection may require outside professional help depending on the cause of the bloom, the mold species involved and the extent of the clean-up.

HEALTH CONCERNS

Those with serious allergies, diabeties, asthma, respritory problems, taking steroids or with impaired immunity should stay away. Major blooms should be assessed by a mycologist. Check with a local hospital. Aspergillis fumigatis can be fatal.

Protective gear and procedures when dealing with mold:

- --plastic gloves
- --goggles
- --respirator, NOT dust mask
- --coveralls or lab coats, preferably disposable
- --foot and head covers for very dirty situations
- --remove coveralls and shower or thoroughly wash hands and face after leaving work area

--use fans, local and "whole house", to increase air circulation
--open windows if outside humidity is lower
--install dehumidifiers, as long as increase in temperature does not increase humidity
--monitor humidity and temperature several times a day. Keep a log.

INACTIVATION

Non-destructive, non-invasive, non-toxic, no-risk, strictly FUNGISTATIC procedures

Goal: Stop mold growth if First Response measures have not controlled outbreak. Necessary if environment remains damp, if number of affected items is large, or if moldy materials are damp.

1. Small scale drying of damp items using same procedures as disaster recovery IN ISOLATED AREA THAT CAN LATER BE CLEANED. Spread papers on tables, fan books, interleave with newprint and/orblotters while controlling humidity and using fans as necessary to circulate air. Drying will inactivate mold.

2. Vacuum drying possible for those with old fumigation chambers. Useful for small to moderate size outbreaks. Most chambers will not create vacuum intense enough to kill mold, but will dry materials and inactivate mold while isolating materials. Alternate vacuum phase and aeration with below 60% RH air. Experiment with chamber before you need it.

3. Dessicant drying done by disaster response company for large outbreaks. Dry air is pumped in and moist air is pumped out. Can dry a large area quickly and inactivate mold. Airdex and Moisture Control Services can provide service and set up very quickly for short or long term use. Costs range from an equipment rental fee of $400 per month for 200 cubic feet to $1,525 per month for 50,000 cubic feet.

4. Freezing stops mold growth and will kill hyphae (active mold growth) but not most spores. Freezing can be done in-house for small outbreaks or by outside vendor for large when the environment or circumstances preclude prompt deactivation by drying. Material can be freeze dried or thawed and air dried. Also effective against insects with proper temperature and duration. (-20° F for 3 days. Freezing and freeze drying not recommended for most photographic materials.

should extend into the solution so incoming moldy air passes through the solution.
--Vacuum papers through a fiberglas screen held down over the paper with weights.
--Use an aspirator, which is essentially a small vacuum with a nozzle the size of an eye dropper, to gently remove mold from valuable or deteriorated material. This generally should be done by a conservator or a skilled technician.
--Rags should be used dry and changed frequently. discarded rags should be placed in a closed container and washed in detergent and bleach.

Cleaning bindings and boxes

--For vacuuming books use a nozzle or brush attachment covered with a cheesecloth or fiberglas screen filter to catch any detached pieces. Adjust suction of vacuum to condition of object. Boxes can be vacuumed directly.
--Moisten rags with 70% ethanol and water solution or Lysol and wipe storage boxes and bindings. Rags should be damp not wet. As rags become soiled, put them in a sealed container and wash them with detergent and bleach.
--Books should be held firmly closed during cleaning. Those with sueded or deteriorated leather bindings should be wiped with rags that are very slightly damp or not at all. The paste down and fly leaf inside the cover can be vacuumed or wiped as necessary.

CLEANING THE STORAGE AREA

--Clean the storage area (shelves, walls, floor) thoroughly with Lysol or bleach. Be sure the area is well ventilated. Don't return collection materials until the area is thoroughly dry and the environment is stable. Clean carpets and drapes if necessary.
--Check and clean heat exchange coils, filters and the duct work of the HVAC system if necessary.
--If odors remains, place charcoal briquettes or bowls of baking soda in the area to absorb odors.

FOLLOW-UP AFTER THE DISASTER

--Monitor all affected materials on a regular schedule to look for renewed mold growth or after effects of treatment or cleaning.
--Monitor the environment in the affected area regularly. Be sure housekeeping and air circulation remain adequate.

SERVICES FOR MOLD DISASTER RECOVERY

Cargocaire Moisture Control Services 85 Fulton Street, Unit 9D Boontoon, NJ 07005 Contact Person: Everett Berger (201) 625-7458	Dehumidification air drying of materials
Solex Environmental Systems (Formerly Airdex) P.O. Box 460242 Houston, TX 77056 Contact Person: Don Hartsell (800) 848-0484	Dehumidification air drying of materials
Document Reprocessers 41 Sutter Street, Suite 1120 San Francisco, CA 94104 Contact Person: Eric Lundquist (800) 437-9464	Freeze drying cleaning of materials fumigation
American Freeze Dry, Inc. 411 White Horse Pike Audubon, NJ 08106 Contact Person: John Magill (609) 546-0777	Freeze drying cleaning of materials fumigation
BMS Catastrophe 303 Arthur Street Fort Worth, TX 76107 Contact Person: Pat Williams Moore (800) 433-2940	Freeze drying cleaning of interiors document reproduction fumigation
Tom Parker Pest Control Services 14 East Stratford Avenue Lansdowne, PA 19050 (215) 284-6249	Entomologist mold recovery advise & services

TEN REASONS WHY LIBRARIES MAY EXPERIENCE DIFFICULTIES IN SETTLING INSURANCE CLAIMS

1. An inventory has never been taken or is out of date.

2. Shelflists and collections have never been weeded.

3. Insurance coverage had not changed with a changing collection or with the depreciating or appreciating value of that collection.

4. Collections have been arbitrarily swelled by gifts and other miscellany to hold space.

5. Extensive runs of periodicals and other materials have been accumulated for the same reason.

6. Used and unused portions of the collection share the same general areas.

7. Shelflists contain a variety of information and inconsistent pricing data.

8. A substantial portion of the collection and its stacks have been completely destroyed.

9. The policy covering the collection has a coinsurance feature, which in case of a fire, may lead to the presumption the collection is underinsured.

10. There is a question as to whether books and other library materials are part of the contents as covered by the policy.

In Roth, Harold L. "Check Your Fire Insurance." ALA Bulletin 55 (Jan. 1961): 54-5.

Insurance for Libraries: Part I

(Part II will appear in CAN Number 20)

Adapted from a presentation made at the March 8, 1984 meeting of the Oklahoma Chapter of the Western Conservation Congress

Many libraries and archives are taking a gamble. They are betting that fire, flood, or some other disaster will not strike their institution. Buildings, equipment, and, most important, collections are not insured. On the surface it seems like a safe risk — after all, how many libraries burn down or are flooded?

As it turns out, disasters strike more frequently than one might think. John Morris, in the second edition of his *Managing the Library Fire Risk*, chronicles dozens of library fires, many quite spectacular and costly in terms of loss. D.L. Ungarelli writes an annual article, "Insurance for Libraries," for the *ALA Yearbook* that describes numerous library and archival disasters for the previous year: fires, floods, earthquakes, tornadoes, etc. Each author makes a good case for the need for library insurance. Numerous other references to library disasters can be found in the literature as well.

Despite the possibility of a disaster, many libraries have no insurance. Disaster planning, a popular topic these days, emphasizes the written disaster plan and recovery procedures for water-damaged materials, not insurance. Yet insurance is an integral part of sound risk management.

Why is insurance so often overlooked? There are several reasons. First, it is a complex subject that most of us do not understand, and therefore wish to avoid. It is an uninteresting topic, compared to the more exciting and challenging aspects of disaster prevention and recovery. Finally, it is something we simply forget about, assuming it has already been taken care of by someone else in the organization.

A caveat is in order here. A discussion of insurance policies and coverage will not have equal relevance to all readers. In many states, public institutions, due to a lack of funding or by law, are self-insured and cannot purchase insurance, or are limited to what they can buy. Also, in terms of liability claims, libraries operated by federal, state, city, or county governments frequently have what is known as "statutory immunity" given them by law for loss resulting from the operation of the library. For example, the public is sometimes denied the right of submitting a claim for injury that occurred on the library premises. This is changing, though, and some states are now exempting libraries from this immunity. Nevertheless, many libraries and archives, public and private, can purchase insurance and will hopefully benefit from this article.

There are two types of insurance: (1) the traditional insurance policy and (2) safety and loss prevention programs. Both are essential parts of a sound risk management program. Insurance, important as it may be, is not nearly as important as avoiding and preventing losses. But as it is impossible to eliminate all sources of loss, insurance policies are a necessary component of a good risk management program.

Insurance, however, cannot be purchased for every risk as the drain of insurance premiums on budgets would be far too great. Therefore, it is necessary to decide how much protection should be provided for the liabilities to which the library or archives is exposed. There is a logical way to do this, based on recognized principles of risk management. (See, for example, A.E. Pfaffle, *Fundamentals of Risk Management*. New York: AMACON; 1976.) The four basic principles in order of consideration are: elimination of risk, assumption of risk, self-insurance of risk, and transfer of risk.

Elimination or Reduction of Risk

The most important part of a comprehensive risk management program should be **risk avoidance** through a well-planned safety and loss prevention program. There are many things that can be done in this regard, and the list that follows is by no means exhaustive. Rather, it is only a selected group of ideas presented as a starting point.

☐ Sound architectural design of buildings and facilities. New libraries and archives should have fire-resistant walls, adequate exits, fire detection and suppression equipment, etc.

☐ Safety education programs for staff. This includes general safety, fire safety, first aid, CPR, use of fire extinguishers, etc.

☐ Regular inspections by fire officials or your insurance agent. Inspections can identify fire hazards or other potential problems (for example, improperly stored flammable materials and blocked or poorly marked exits).

☐ An emergency procedures manual. The emergency manual should be written by the staff and should include an evacuation plan with which all employees become very familiar (so they do not have to stop and read it when a real emergency occurs — there is no time!). All potential emergencies, large and small, should be covered. Emergency phone numbers, names, and procedures should be included.

☐ Adequate and proper fire extinguishers. Fire extinguishers should be numerous, highly visible, and, if possible, the type used on all classes of fires (wood and paper, flammable liquids, electrical fires).

☐ Equipment to prevent personal injury or property damage. This includes both detection devices and fire extinguishing systems. A wide variety of smoke and heat detectors are available. Some even detect changes in the air before smoke is seen. Fire extinguishing systems include both sprinklers and Halon 1301 gas. There are many types of sprinklers, including those that turn off after the fire is extinguished. Others have empty pipes until a fire is detected; then they are "charged" with water for use.

A common misconception is that water will do more damage than fire. This is simply not true: wet books can be salvaged more easily and less expensively than burned books. Further, water from the localized spray of a sprinkler nozzle or two will put out a fire quickly and cause far less water damage than a fire hose shooting hundreds of gallons of water a minute into the stacks. Books that are severely water-damaged cannot always be salvaged, however. Some will be so wrinkled and warped (and wet!) that they cannot be used again.

Halon 1301 is a colorless, odorless gas that is a very effective fire suppressant, though very expensive. It is usually used in rare book areas and computer rooms where water sprinklers are to be avoided. The use of Halon depletes the oxygen supply, however, so careful consideration of exits in case of discharge is necessary.

☐ Miscellaneous safety measures. Enclose vertical openings in your building, such as stairwells. Keep fire doors shut; newer buildings have automatic door closing devices. Seal off book slots and buy on-the-curb book drops; this can be expensive, but will remove an easy

*Reprinted from Conservation Administration News, volume 19 (October 1984)

opportunity for arsonists. Store flammable liquids and paper properly. Clean out attics. Check wiring and fuse boxes.

☐ Duplicate valuable records. This would include financial and personnel files that are not duplicated elsewhere, such as in the accounting or personnel offices of your institution. Not intrinsically valuable, they are hard to replace or re-create.

☐ Microfilm or otherwise duplicate the shelflist or card catalog. Not only would this provide a detailed inventory to prove a loss after a fire, but it would make the job of putting the library back in business far easier. Another option is to have machine-readable backup files, such as OCLC or RLIN records on tape.

☐ Make duplicates of cataloging or other data on magnetic tape or disk. Insurance will only pay for replacing the medium (tapes or disks), not recreating the records. The backups for both paper and computer data should be kept off-site!

Local fire and law enforcement officials, your institution's engineers, and insurance agents can all assist you in reviewing present procedures or in establishing new programs. Maintain good relations with all groups. Not only can they help you develop a loss prevention program and review insurance coverage, but they will be better prepared when an emergency does arise. Fire officials, for example, should be familiar with your building's layout to be most effective.

Not only does a loss prevention program reduce risks, it also helps lower the cost of insurance to the institution. Insurance rates are determined after a thorough review of the types and number of materials to be covered, the type and extent of coverage desired, and the likelihood of a disaster. The latter is strongly influenced by the existence of a loss prevention program as well as related items, such as the age and fire-resistance of the building. A library will receive a series of credits and debits after a review of these areas. A score is derived from this information that affects the rates received. It is not unlike credit given to a non-smoker on a life insurance policy.

In short, a loss prevention program both reduces risk and reduces insurance premiums. It is a good move to make!

Assumption of Risk

While almost any risk can be insured for a price, it is often uneconomical or otherwise undesirable to insure risks that the organization can and should assume itself. Many losses are best treated as normal maintenance expenses. Most libraries or their parent institutions can simply not afford insurance for all possible risks. Management, therefore, should carefully analyze risk to see what can be assumed. For libraries, examples would be book theft, minor vandalism, normal maintenance, and certain repairs.

Self-Insurance of Risk

Another method of dealing with risks is the establishment of a reserve fund that is kept separate and invested so that cash will be available for payment of losses. Apart from this funded reserve, self-insurance is a form of self-assumption of risk.

Why be self-insured? First, for risks of a magnitude exceeding normal maintenance budget items, it can often provide adequate protection at a cost lower than outside insurance. Second, there may not be an insurance market for the items in question. Third, self-insurance may help secure the confidence of employees or the public. Before deciding to self-insure risks, one should carefully weigh the savings involved against the expense of administering the program.

Transfer of Risk

The last element in the formula of risk management involves the assumption of risk by other parties, either through a specific written agreement, such as a hold-harmless clause in a lease, or through insurance purchased from commercial insurance companies.

The important thing is that this, the most traditional method of protection against risks, is only the last piece of the risk management formula. Most people think of the insurance policy first and foremost and ignore the other methods of risk management cited above. An intelligent combination of this method with the other three will enable organizations to meet risks much more economically than would be possible using commercial insurance only.

Robert A. Seal
University of Oklahoma

CAN Announces New Feature

In a small but growing field such as library conservation, it is inevitable that some subjects and some problems have been overlooked or inadequately discussed in print. In an attempt to help those faced with problems about which they can find little or no information, CAN will run a new feature, a question and answer column. The feature will be managed by Robert DeCandido who has, for the last ten years, been an administrator in the Conservation Division of the Research Libraries of the New York Public Library. His work has brought him into contact with all areas of conservation and he is currently Head of the Shelf and Binding Preparation and Collections Maintenance Office.

In an effort to get the ball rolling and stimulate your participation, we will hold a contest to name the new feature. The prize for the best name will be a poster from the NYPL exhibition "Censorship, 500 Years of Conflict," graciously donated by Mr. DeCandido. (His first offer of a slightly used copy of the 1982/83 ALA *Handbook of Organization* was rejected by the editor.) All entries must be accompanied by a question. Please send your questions (with or without contest entries) to Toby Murray, Managing Editor, CAN, McFarlin Library, The University of Tulsa, 600 South College Avenue, Tulsa, Oklahoma 74104. Contest entries must be received by December 1, 1984. The winner will be regaled in the January issue.

Preservation News

New Newsletter

The Oklahoma Special Collections and Archives Network issued its first newsletter (OK SCAN) in June. It contains information of the recently-established organization's activities and goals. For information about OSCAN and its newsletter, contact its President, John Lolley, Central State University, Edmond, Oklahoma 73034.

Insurance for Libraries: Part II

(Continued from CAN Number 19)

A library is a peculiar institution for insurance purposes in the sense that it cannot ever be re-established exactly as it was before the disaster. That is, it is impossible to replace the identical titles it contained before the loss. Some books cannot be replaced because of their rarity (no copies are available even on the out-of-print market). Other materials, such as manuscripts, can never be replaced. Still other items do not need to be replaced; they are outdated, superceded editions that should have been weeded out but never were, or they are of marginal value and do not justify the time and effort to replace. As is evident, replacing a library or archival collection is not a straightforward exercise. It is not a matter of simply replacing typewriters and other office equipment or stock in a store, as is often the case in insuring a business. Libraries present special problems for insurance companies and for the librarians who must deal with insurance.

Kinds of Property to be Covered

When we think of insurance coverage for libraries and archives, we first think of books and other library materials. The insurance of collections, though, is only one part of the story. Briefly, any of the following may be covered by insurance policies: buildings; improvements and betterments (renovations done on a leased building); furniture, fixtures, and equipment (excludes licensed vehicles); books and other library materials; fine arts, rare books, original paintings; consumable supplies and materials; valuable records (the so-called "valuable papers and records policy" for books will be covered below); electronic data; employees' property at work, and property of others for which the library is responsible (such as leased equipment or art on loan).

Perils

There are a number of perils, or hazards, to which library property may be subject. These include, but are not limited to fire and lightning, windstorm, tornado, hail, explosion, water damage from defective plumbing, burglary, and earthquake. Each policy is different, so read yours carefully to see what is covered and what is not. So-called "all-risk" policies cover many of these, but not necessarily all. They usually exclude flood, for example.

Liability

In addition to the perils of fire, wind, and water, libraries are also subject to liability claims (law suits). Liability may include bodily injury; personal injury (false arrest, libel, slander, wrongful entry or eviction); civil and constitutional rights violations (insurance is generally not available, except possibly under a separate, limited policy); and property damage, such as a fire or explosion in a nearby building (does not cover property of others in the care of the insured).

Miscellaneous Insurable Risks

There are also a few miscellaneous risks that could be insured. These are not usually covered in policies to protect libraries, and separate policies or clauses will be needed if coverage is deemed important. Included are injury to employees (your institution may have coverage), employee dishonesty, steam boiler, plate glass, and property in transit (often applicable to libraries with regard to travelling exhibits, usually a short-term agreement with the borrowing library paying).

Some Advice

When insuring your library, think in negative terms. That is, ask what is not covered by the policy, then move to correct any deficiencies. Do not assume that everything and every type of liability is covered by your policies. Make sure it is!

Appraisals and Valuation of Property

In the process of obtaining insurance coverage for a library or archives, it is first necessary to place a value on the building, equipment, and collections. It is the responsibility of the insured to determine value of property to be covered, not the insurance company. If you have trouble evaluating the collection, consider hiring a consultant, perhaps a librarian or archivist with experience in this area.

Property losses for libraries and archives are settled on one of two bases: 1) **replacement cost** if the items are replaced — the actual cost with no deduction for depreciation (most costly) or 2) **actual cash value**, defined as the market value for a "marketable" item (such as a used typewriter), or replacement cost less depreciation for buildings and personal property not available on the used market. An exception is the fine arts or valuable papers policy. "Valuable" is an insurance term that means certain records have some intrinsic value to your organization because they are vital to its operation. Also called "intangibles," they include records whose value goes beyond the cost of the material plus transcription, such as financial records that are valuable beyond the mere paper they are printed on. Other examples are circulation records or patron registration files. Books, shelflist cards, and special indexes are sometimes covered, too, depending upon the policy. With a fine arts or valuable paper policy, the insurance company will agree on a value for loss settlement in advance. The institution must decide if it wants replacement cost coverage or settlement based upon actual cash value, or a combination.

Furniture, Fixtures, and Equipment

A detailed inventory is necessary for arriving at a total insurable value and for establishing or proving a loss for equipment and furniture. With equipment, settlement is often on a cash value basis. Therefore, the purchase price of the equipment must be depreciated. Depreciation is related to the expected life of the product. For example, office furniture has an expected life of 15 to 20 years; computer equipment is 3 to 5 years. Divide the total cost by the number of years to get the annual depreciation. Installation costs for equipment, especially communications and computer equipment, should be included. Like all insurance documents, keep a copy of the inventory off the premises.

Books and Library Materials

This is the most difficult aspect of valuation. However, to determine how much of the collection is to be covered is an extremely important decision and an exercise that must be completed before insurance coverage can be finalized. The results of such an analysis should be clearly spelled out in writing for your records and for the insurance company.

A percentage of coverage, about one-third of the collection, is often used with a per volume value. By covering only a percentage of the collection, one is able to lower the cost of insurance premiums. Furthermore, this is a safe and logical approach, as no library's collection can be completely replaced. Partial coverage is therefore not a detriment. Materials should be divided into categories

(books, periodicals, microforms, films, etc.), as there are too many items to have a detailed inventory and pricing. An average price must be determined for each category using cash value or replacement cost. Do not forget to include binding and processing costs.

Where can you get "average" prices? Sources such as *Bowker Annual* are good, as long as they are used carefully. There are four things that must be taken into account when using *Bowker* or similar sources based on average prices: the list prices of newly published volumes may not be based on the same mix as your library's mix, an adjustment must be made for the discount included in the purchase price, the cost of processing is not included in the price, and the current average prices are not entirely applicable because only a small portion of the library's books were purchased in the current year. It may be better to take a three or four year average in determining costs. One additional problem with collection valuation is that many of the older books and back runs of periodicals are only available on the used book market and prices there do not necessarily parallel current prices.

Other options include obtaining pricing information from publishers, especially for specialty fields such as law and medicine, or from the library's order records, if possible. As you can see from this very brief analysis, this is not a trivial problem. It is very complex and it takes time to do a thorough job. Whatever is done, though, should be done consistently on an annual basis.

Rare Books and Manuscripts

Rare materials should be appraised by a professional on a regular basis, at least annually if not more often. This is very important because your insurance policy will usually only pay according to the values in the most recent appraisal. Each item should be insured separately for the purchase price or the appraised value. Libraries with many rare books may wish to insure the very rare items separately, and provide an average price for the rest. Do not forget to cover art objects, too, such as paintings and sculpture. These valuable items are frequently overlooked.

Insurance Coverage and Policies

Library insurance has always been considered "good business" and, as a result, insurance companies treat libraries as a preferred class eligible for "package" policies and maximum rate credits. There are two basic approaches that can be taken: a blanket policy on buildings and contents, or separate policies for library materials.

Blanket Property Policy on Buildings and Contents

This approach is desirable because it permits various classes of properties (books, equipment, supplies, and buildings) at various locations to be included on a single policy with a single amount of insurance. This relieves being over- or under-insured on any category of item. The basic coverage is for fire and extended coverage (wind, explosion, aircraft or vehicle damage, smoke, and riot). Additional coverage, such as for flood, is available.

A statement of value is required and insurance is written with a 90% co-insurance clause (with insurance to 90% of total value). Values may be replacement cost or cash value, the latter being the basic coverage.

Books and Library Materials

Two options are available:

☐ **Blanket contents form.** This type of coverage is a more limited form of the previously cited blanket contents policy as it only refers to certain contents (the library materials), not buildings or equipment. Coverage is usually on a cash value basis; however, many companies will insure books on a replacement cost basis, if the items are actually replaced. There are deductibles of varying rates and a 90% co-insurance clause applies.

☐ **Valuable papers form** (Also known as the "Valuable Papers and Records Policy"). Historically, books and library materials have been insured separately because they are "papers" and therefore are psychologically "valuable." Some points to consider regarding the valuable papers policy: a) the policy is usually in two parts: one for the rare items and one for the non-rare materials b) it provides very broad "all risk" coverage without the usual flood and earthquake exclusions c) it is not subject to a co-insurance clause; that is, full coverage instead of partial coverage is possible d) unit values for various classes of property are required e) loss is limited to cash value; the insurance company, however, may agree to replacement cost coverage. The cash value clause is excellent because it allows for market appreciation of rare books and manuscripts. However, it also allows for depreciation, which could be a disadvantage at times.

There was also, at one time, a special policy, no longer available, known as the Hartford Library Policy because it was developed by the Hartford Fire Insurance Company and the American Library Association. It is covered elsewhere in the literature and will not be addressed here.

Libraries may also wish to obtain what is known as "extra expense" insurance. An extremely important form of coverage, it is used to provide extra manpower and assistance to recover from a disaster, to recreate records, order and process books, etc. It is not a standard clause, however, and must be added as a rider to a policy.

Overview

Which type of policy is chosen will depend on the institution and its own special needs, financial capabilities, and philosophy of risk management. A careful analysis of your own situation is a key first step. The development of a loss prevention and safety program is next. Purchase of insurance is only the final step in a complete program of risk management. Each step should be repeated on a regular basis to keep current and to ensure adequate protection.

Library Insurance: A Selected Bibliography

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Antiquarian
continued from page 2

ionized water, deacidification apparatus, light table, binding equipment, and photodocumentation equipment. His staff consists of an experienced conservation technician and an intern serving a two-year apprenticeship at AAS. These conservators restore printed artifacts to their original condition and repair and mend torn or broken items that have only modest value but cannot be replaced. In addition, the chief conservator assists in monitoring the climate control system; supervises and monitors the fumigation program; and develops, upgrades, and implements an institutional disaster plan. He also consults with the curators and librarians about particular needs within the collections and oversees the selection and treatment of special materials sent to outside conservation facilities.

This brief sketch can only outline the long road toward preservation and conservation traversed since the incorporation of the American Antiquarian Society in 1812. In each generation and under each administration, the five fundamental elements were present to a greater or lesser degree: secure building, protective binding, environmental control, multiplication and reproduction of text, and comprehensive treatment facility. In the early years preservation and conservation consisted primarily of safe storage. Currently the definition has grown and includes air handling equipment, sophisticated electronics, and complete restoration facilities. With these several elements and activities housed within a fire-resistant building, as they are at the American Antiquarian Society, along with a professional microfilm office, there is reason to conclude that the hopes and expectations of the founders expressed in the motto NEC POTERIT FERRUM NEC EDAX ABOLERE VETUSTAS may be realized.

Frederick E. Baur, Jr.
American Antiquarian Society

(Ed. Note: The April issue of CAN *will feature an article on a disaster recovery training workshop conducted by AAS Chief Conservator Richard C. Baker.)*

Sponable
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each box, and the film and screen samples were tagged and removed to separate storage. The organization of the collection, which had been left remarkably intact despite human, vermin and environmental destruction, was reflected in a thirty-page guide to the collection. The personal payoff is that I've been around to see not one, but a number of researchers, exclaiming "Eureka" or at least "Gee whiz" as they explore this extraordinary technological archive.

Mary B. Bowling
Thomas A. Edison National Historic Site (formerly at Columbia University Libraries)

Insurance
continued from page 11

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Robert A. Seal
University of Oklahoma

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and Sally Buchanan are listed as Conservation Officers and Carolyn Clark Morrow as a Conservation Librarian. If one uses the NCAC definition of "conservation," he will understand the work of the three individuals to be very broad in scope, but if one uses Ms. Darling's definition of the same word, he will perceive their work as much more limited.

This whole matter of developing a professional lexicon is not a subject to be taken lightly. If we cannot communicate among ourselves with any degree of precision, we certainly cannot expect others to understand what we are talking about. We have enough problems in library and archives conservation without having to specify with each utterance or sentence whether we are using NCAC or Darling definitions.

Michael McColgin, Conservator
Arizona State Archives

Philadelphia
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place in a quiet library. But our readers remained patient. The most exciting moments were when the casework and sink arrived. This cement and plaster shell began to look like a bindery. Things moved along very quickly at this point and only a few problems were encountered. The top half of the fume hood arrived, but the bottom half was delayed by a truck accident during a snowstorm in the Midwest. Someone, somewhere, misunderstood my request that the flat files be able to accept paper that was thirty-two inches by forty inches. Instead, they arrived made for paper that is forty-two inches by thirty inches.

Sometimes, what looked right in the blueprints, was unacceptable in reality. At one point, the shelves over the counters were hung so high (according to specifications) that I could not reach the bottom shelf. We thought the plans had been very carefully reviewed, but a few mistakes did get past us. Cunningham was able to make the appropriate changes to fit our needs.

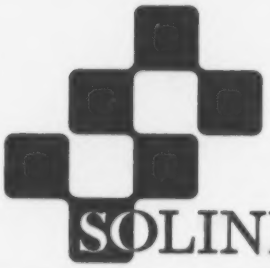
Finally, in early April 1984, we moved into the new bindery. It has already made a big difference in our work. Using the movable tables, we are able to create work areas to fit our daily needs. We can butt them together, push them up to a counter, or move them out of the way altogether.

We were fortunate to have an intern working in the bindery this summer and we hope to hire a third person within the year by matching a generous grant from the Andrew W. Mellon Foundation.

Since moving in, we have helped install three exhibits with ease and in record time. Our environment is much more pleasant now. We feel more a part of the general staff as we are no longer segregated off on the third floor. Our tools, supplies, and equipment are all within easy reach, making projects flow smoothly. And, of course, the terraces no longer leak into the rooms below.

Jennifer Woods
The Library Company of Philadelphia

❄



Southeastern Library Network, Inc.
1438 West Peachtree Street, N.W.
Suite 200
Atlanta, Georgia 30309-2955
Telephone (404) 892-0943
Toll-Free 1-800-999-8558
FAX (404) 892-7879

SOURCES OF CONSERVATION/PRESERVATION PRODUCTS & SERVICES

SOLINET Preservation Program
Leaflet #2.5
January 1992

The following list includes companies that provide supplies, equipment, and (in few cases) services that may be useful in conservation and preservation activities. Each entry includes the company's name, mailing address, and (when available) phone number. In the right column is a brief indication of the product or products available through each firm. Those listed as "general" suppliers carry a wide variety of products.

Inclusion in this list does not imply SOLINET endorsement, nor does the omission of any supplier indicate censure. This leaflet will be revised from time, as additional suppliers are identified.

Aabbitt-Jade Adhesives — *adhesives*
2403 N. Oakley
Chicago, IL 60647
312-227-2700, 800-222-2488

Abbeon Cal, Inc. — *equipment*
123 Gray Avenue
Santa Barbara, CA 93101
805-966-0810

Absorene Manufacturing Co. — *surface cleaning materials*
1609 North 14th Street
St. Louis, MO 63106
314-231-6355

Aiko's Art Materials Import — *papers, supplies*
714 North Wabash
Chicago, IL 60611
312-943-0475

Airguide Instrument Co. — *hygrometers, psychrometers*
2210 Wabansia Avenue
Chicago, IL 60647
312-486-3000

American Freeze-Dry, Inc. — *disaster recovery svcs*
411 White Horse Pike
Audubon, NJ 08106
609-546-0777

Andrews/Nelson/Whitehead — *paper and binding materials*
31-10 48th Avenue
Long Island, NY 11101
212-937-7100

Applied Science Laboratory — *Barrow paper test kit*
2216 Hull Street
Richmond, VA 23224
804-231-9386

Archivart Division — *paper supplies*
Heller & Usdan, Inc.
7 Caesar Place
Moonachie, NJ 07074
201-804-8986, 800-333-4466

Art Handicrafts Co. — *rivets*
3512 Flatlands Avenue
Brooklyn, NY 11234
516-569-3588

B & G Equipment Co. — *fumigation bubble for use with carbon dioxide*
P.O. Box 130
Applebutter Lane
Plumsteadville, PA 18949
215-766-8811

Beckman Instruments — *environmental monitoring equipment*
2500 Harbor Blvd., North
Fullerton, CA 92635
714-871-4848

Bendix Corporation — *gas detector kits*
National Environment Instruments Div.
P. O. Box 520, Pilgrim Station
Warwick, RI 02888

Bill Cole Enterprises — *Mylar sheets & envelopes*
P. O. Box 60
Wallaston, MA 02170-0060

Blackmon-Mooring-Steamatic Catastrophe, Inc. (BMS CAT) — *disaster recovery services*
One Summit Avenue, Suite 202
Fort Worth, TX 76102
817-926-5296
24-hour hotline: 800-433-2940

Bookbinder's Warehouse — *leather, bookbinding supplies*
31 Division Street (Rear)
Keyport, NJ 07735
201-264-0306

BookLab, Inc. — *boxmaking, binding, and conservation*
8403 Cross Park Drive
Suite 2E
Austin, TX 78754
512-837-0479

Bookmakers — *general*
6001 66th Avenue
Suite 101
Riverdale, MD 20737
301-459-3384

Calumet Photographic, Inc. — *storage enclosures, photographic supplies*
890 Supreme Drive
Bensenville, IL 60106
312-860-7447, 800-225-8638

Charrette Corporation — *surface cleaning supplies, small tools, Fome-Cor*
31 Olympia Avenue
P.O. Box 4010
Woburn, MA 01888
617-935-6000/6010

Chicora Foundation, Inc. — *insect monitors & traps, consulting*
P.O. Box 8664
Columbia, SC 29202
803-787-6910

Cole-Parmer — *environmental monitoring equipment, pH testing materials*
7425 North Oak Park Ave.
Chicago, IL 60648
312-647-0272

Conservation Center for Art & Historic Artifacts — *conservation services*
264 South 23rd Street
Philadelphia, PA 19103
215-545-0613

Conservation Materials, Ltd. — *general*
340 Freeport Boulevard
Box 2884
Sparks, NV 89431
702-331-0582

Conservation Resources Int'l — *paper, board, plastic, & photographic supplies*
8000 Forbes Place
Springfield, VA 22151-2204
703-549-6610

Dickson Instruments Co. — *ACR datalogger & other environmental monitoring equipment*
930 South Westwood Drive
Addison, IL 60101
312-543-3747, 800-323-2448

Dietzgen Corporation — *Skum-X cleaning powder and pads*
35 Cotters Lane, Bldg EB 10-3
East Brunswick, NJ 08816
201-935-2900

Dinh Company — *dehumidifying heat-pipe for HVAC systems*
P.O. Box 999
Alachua, FL 32615
904-462-3464

Document Reprocessors *disaster recovery services*
55 Sutter Street, Suite 120
San Francisco, CA 94104
415-362-1290, 800-4-DRYING

Dorlen Products *surface water detectors*
6615 West Layton Avenue
Milwaukee, WI 53220
800-533-6392

Dual Office Suppliers, Inc. *photocopier*
2411 Bond Street
University Park, IL 60466
312-534-1500

DuPont de Nemours (E.I.) & Co., Inc. *Mylar rolls*
Fabrics & Finishes Dept.
Industrial Products Division
Wilmington, DE 19898

Durasol Drug & Chemical Co. *dry cleaning pads*
1 Oakland Street
Amesbury, MA 01913

Duro-Test Corporation *hard plastic UV filters*
2321 Kennedy Blvd. *(Durogard safety shields)*
North Bergen, NJ 07047
201-867-7000

EM Industries *pH test strips*
111 Woodcrest Road
P. O. Box 5018
Cherry Hill, NJ 08034-0395
609-354-9200

Environmental Tectonics Corp. *environmental*
County Line Industrial Park *monitoring equipment*
Southhampton, PA 18966
215-355-9100, 800-523-6079

Filmolux (USA) Inc. *"archival" repair tape*
4600 Witner Industrial Estate #9
Niagara Falls, NY 14305
716-298-1189, 800-873-4389

Fire Equipment, Inc. *fire extinguishers & detectors*
88 Hicks Avenue
Medford, MA 02155
617-391-8050, 800-451-5015

Fisher Scientific Co. *environmental monitoring eqpt.*
711 Forbes Avenue
Pittsburgh, PA 15219
412-562-8300

Garrison/Lull Consultants *architectural and*
P.O. Box 337 *environmental consulting*
Princeton Junction, NJ 08550
609-259-8050

GripTites, Inc. *Pink Pull fasteners*
67 Country Place Lane
Rochester, NY 14612-1445
716-392-8637

Franklin Distributors Corp. *photographic storage*
P. O. Box 320 *supplies*
Denville, NJ 07834
201-267-2710

Gallard-Schlesinger *sulphur dioxide test paper*
584 Mineola Avenue
Carle Place
Long Island, NY 11514
516-333-5600, 800-645-3044

Gane Bros. & Lane, Inc. *bookbinding supplies &*
1400 Greenleaf Avenue *equipment*
Elk Grove Village, IL 60007
312-437-4880

Graham Magnetics, Inc. *disaster recovery of*
6625 Industrial Park Boulevard *computer media*
North Richland Hills, TX 76118
817-281-9450

Hamilton Industries *map cases*
1316 18th Street
Two Rivers, WI 54241

Herzog/Wheeler & Associates *ACR datalogger for*
430 Oak Grove, Suite 311 *temperature & humidity*
Minneapolis, MN 55403 *monitoring*
612-870-4555

Hollinger Corporation *general & photographic*
P. O. Box 6185
3810 South Four Mile Run Drive
Arlington, VA 22206
703-671-6600

I. C. I. America Inc. *polyester sheets/rolls*
Plastics Division
Wilmington, DE 19897

Robert Jacobson: Design *preservation posters*
P. O. Box 8909
Moscow, ID 83843
208-882-3749

Jon Kennedy Cartoons *preservation posters*
P. O. Box 1488
Little Rock, AR 72203

The Kimac Company *inert plastics*
478 Long Hill Road
Guilford, CT 06437
203-453-4690

Landmark Facilities Group *architectural and environmental consulting*
252 East Avenue
Norwalk, CT 06855
203-866-4626

Langan Products, Inc. *DataBear datalogger for temperature & humidity monitoring*
2660 California Street
San Francisco, CA 94115
415-567-8089

Library Binding Service *pamphlet binders, preservation photocopying service*
2134 E. Grand Ave.
P. O. Box 1413
Des Moines, IA 50305
515-262-3191, 800-247-5323

Light Impressions Corp. *general & photographic*
439 Monroe Avenue
P. O. Box 940
Rochester, NY 14603
800-828-6216

Littlemore Scientific Engineering *ultraviolet light meter*
Railway Lane, Littlemore
Oxford, OX4 4PZ, ENGLAND

Magnetic Aids, Inc. *non-knifing bookends*
133 North 10th Street
Paterson, NJ 07522
201-790-1400

William Minter *ultrasonic welder for encapsulation*
1948 West Addison
Chicago, IL 60613
312-248-0624

Moisture Control Services *disaster recovery svcs, including dehumidification*
79 Monroe Street
Amesbury, MA 10913
617-388-0600

Moisture Control Services *disaster recovery svcs*
6900 Peachtree Industrial Blvd.
Suite I
Norcross, GA 30071-1030
404-242-0935

Northeast Document Conservation Center (NEDCC) *conservation svcs, preservation microfilming, photograph duplication*
100 Brickstone Square
Andover, MA 01810-1428
508-470-1010

Northern Archival Copy *preservation photocopying*
4730 Lorinda Drive
Shoreview, MN 55126
612-483-9346

Northstar Freeze Dry Mfg. *freeze-dry chambers*
P. O. Box 409
Nisswa, MN 56468
218-963-2900, 800-551-3223

Oce-Business Systems, Inc. *photocopier*
1351 Washington Boulevard
Suite 3000
Stamford, CT 06902
203-323-2111

Photofile *photographic storage*
2020 Lewis Avenue
Zion, IL 60099
312-872-7557

Pilcher-Hamilton *Mylar, polyester film*
1850 South 25th Avenue
Broadview, IL 60153
312-343-6660

The Pine Cone — *mini vacuum cleaner*
Blake Building
P. O. Box 1378
Gilroy, CA 95021-1378
408-842-7597 or -4797

Plastic Reel Corp. of America — *inert plastic containers for audio-visual media*
Brisbin Avenue
Lyndhurst, NJ 07071
201-933-5100, 212-541-6464

Pohlig Bros., Inc. — *archival storage materials*
P. O. Box 8069
Richmond, VA 23223
804-644-7824

Printfile, Inc. — *photographic storage*
Box 100
3909 State Street
Schenectady, NY 12304
518-374-2334

Process Materials Corp. — *methyl cellulose, neutral & buffered paper, matboard, oversize acid-free tubes*
301 Veterans Boulevard
Rutherford, NJ 07070
201-935-2900, 800-631-0193

Randomex, Inc. — *disaster recovery of computer media*
Data Recovery Division
1100 East Willow Street
Signal Hill, CA 90806
213-595-8301

Raychem Corporation — *water-sensing cable system*
TraceTek Products Group
300 Constitution Drive
Menlo Park, CA 94025
415-361-3333 or 6484

Re-Oda Chemical Engineering — *restoration of fire-damaged materials*
100 Industrial Parkway
P. O. Box 424
Chagrin Falls, OH 44022
216-247-4131 (call collect)

Rohm & Haas, Plastics Division — *ultraviolet filtering materials*
Independence Mall West
Philadelphia, PA 19105
215-592-3000

Rustrack Instruments — *Ranger datalogger for temperature & humidity monitoring*
Route 2 and Middle Road
East Greenwich, RI 02818
401-884-6800

Science Associates — *environmental monitoring equipment*
Qualimetric, Inc.
P. O. Box 230
Princeton, NJ 08542
609-924-4470, 800-247-7234

Semco — *pamphlet binders*
P.O. Box 23625
Milwaukee, WI 53223
414-357-6900

Solar-Screen Company — *ultraviolet filtering material*
53-11 105th Street
Corona, NY 11368-1718
718-592-8223, 800-862-6233 (get dial tone, dial 1978)

Solex Technologies — *disaster recovery services*
2700 Post Oak Boulevard
Suite 1530
Houston, TX 77056
713-963-9405

Solomat Corporation — *environmental monitoring equipment*
Glenbrook Industrial Park
652 Glenbrook Road
Stamford, CT 06906
800-932-4500

SOS International — *disaster recovery services*
377 Oyster Point Boulevard
Suite 19
South San Francisco, CA 94080
800-223-8597

Nathan Stolow, PhD — *architectural & environmental consulting*
P.O. Box 194
Williamsburg, VA 23187
804-253-0565

TALAS — *general*
Technical Library Service
213 West 35th Street
New York, NY 10001-1996
212-736-7744

TCA-Taylor *environmental monitoring equipment*
Consumer Products Division
Sybron Corporation
95 Glenn Bridge Road
Arden, NC 28704
704-684-5178, 800-438-6045

3M *polyester sheets/rolls,*
Film & Allied Products Div. *tape for encapsulation*
3M Center
St. Paul, MN 55101
800-328-0067

Thermoplastic Processes, Inc. *Arm-a-Lite hard*
Valley Road *plastic UV-filtering tubes*
Stirling, NJ 07980
201-647-1000

Thomas Scientific *environmental monitoring eqpt,*
P. O. Box 99 *laboratory supplies*
99 High Hill Road
Swedesboro, NJ 08085
215-988-0533, 800-345-2100

Total Information Limited *photocopier*
P. O. Box 79
Luton, Bedfordshire LU3 1SE, England
(0582) 412684

Transilwrap Company *photographic storage*
2615 North Paulina Street
Chicago, IL 60614
212-594-3650

University of Minnesota Bindery *preservation*
2818 Como Avenue, SE *photocopying*
Minneapolis, MN 55414
612-626-1516

University Products *general & photographic*
P. O. Box 101
South Canal Street
Holyoke, MA 01041
800-628-1912

VL Service Lighting *low-UV fluorescent tubes*
200 Franklin Square
Somerset, NJ 08873
201-563-3800

Verd-A-Ray Corporation *low-UV fluorescent tubes*
615 S. Front Street
Toledo, OH 43605
419-691-5751

VWR Scientific *environmental monitoring eqpt,*
P.O. Box 232 *conservation chemicals, tools and*
Boston, MA 02101 *lab equipment*

S. D. Warren Co. *acid-neutral & alkaline paper*
225 Franklin Street
Boston, MA 02101

Wei T'o Associates, Inc. *deacidification supplies &*
P. O. Drawer 40 *equipment, book*
21750 Main Street, Unit 27 *dryer/exterminator*
Matteson, IL 60443
312-747-6660

SALVAGE OF WATER-DAMAGED ARCHIVAL COLLECTIONS

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SALVAGE AT A GLANCE

Material	Priority	Handling Precautions	Packing Method	Drying Method
Paper				
Manuscripts, documents and small drawings	Freeze or dry within 48 hours	Don't separate single sheets	Interleave between folders and pack in milk crates or cartons	Air, vacuum, or freeze dry
Watercolors, and other soluble media	Immediately freeze or dry	Do not blot	Interleave between folders and pack in milk crates or cartons	Air or freeze dry
Maps; oversize prints and manuscripts	Freeze or dry within 48 hours	Don't separate single sheets	Pack in map drawers, bread trays, flat boxes or poly covered plywood	Air, vacuum, or freeze dry
Coated papers	Immediately pack, then freeze or dry within 48 hours		Keep wet in containers lined with garbage bags	Freeze dry only
Framed prints and drawings	Freeze or dry within 48 hours		Unframe if possible, then pack as for manuscripts or maps above	Once unframed and unmatted, air or freeze dry
Books				
Books and pamphlets	Freeze or dry within 48 hours	Do not open or close, do not separate covers	Separate with freezer paper, pack spine down in milk crate or cardboard box	Air, vacuum, or freeze dry
Leather and vellum bindings	Immediately freeze	As above	As above	Air or freeze dry
Books and periodicals with coated papers	Immediately pack. Freeze or dry within 48 hours	As above	Keep wet; pack spine down in containers lined with garbage bags	Freeze dry only
Paintings				
Paintings	Immediately dry	Drain and carry horizontally	Face up without touching paint layer	Air dry. See instructions
Floppy Diskettes				
Floppy Diskettes	Immediately pack	Do not touch diskette surface with bare hands	Contact supplier for best method	Contact supplier for best drying method
Sound & Video Recordings				
Discs	Dry within 48 hours. Freezing is untested, if it is necessary freeze at above 0 F (-18 C)	Hold disks by their edges. Avoid shocks	Pack vertically in ethafoam-padded plastic crates	Air dry
Sound and videotapes	Freezing is untested; if it is necessary, freeze at above -10 C		Pack vertically into plastic crates or cardboard cartons. Don't put any heavy weight on the sides of reels or cassettes	Air dry
Photographs				
Wet Collodion photographs (ambrotypes, tintypes, panotypes, wet collodion negatives)	Recovery rate is low. Immediately dry	Handle with care -- glass supports or glazing	Horizontally in padded container	Air dry face up. Never freeze
Daguerreotypes	Immediately dry	Handle with care -- usually cased behind glass	Horizontally in padded container	Air dry face up
Nitrates with soluble emulsions	Immediately freeze	Do not blot		Air dry; test freeze drying
Prints, negatives, and transparencies	Freeze or dry within 72 hours. Salvage order: 1) color photographs, 2) prints, 3) negatives and transparencies	Do not touch emulsions with bare hands	Keep in cold water. Pack in containers lined with garbage bags	Order of preference: 1) air dry, 2) thaw and air dry, 3) freeze dry. Do not vacuum dry
Motion Pictures	Rewash and dry within 72 hours		Fill film cans with cold water and pack in plastic pails or cardboard cartons lined with garbage bags	Arrange for film processor to rewash and dry
Microfilm rolls	Rewash and dry within 72 hours	Do not remove from boxes; hold cartons together with rubber bands	Fill boxes with water, and pack (in blocks of 5) in a cardboard box lined with garbage bags	Arrange for a microfilm processor to rewash and dry
Aperture cards	Freeze or dry within 48 hours		Keep wet inside a container lined with garbage bags	Air dry
Jacketed Microfilm	Freeze or dry within 72 hours		Keep wet inside a container lined with garbage bags	Air dry
Diazo fiche	Last		In drawers or cartons	Air dry

Betty Walsh, Conservator, Provincial Archives of British Columbia

western association waac for art conservation

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Fire Fighters

An Automatic Fire Suppression System Is Among Your Museum's Best and Safest Forms of Insurance

By J. Andrew Wilson

Ask anyone responsible for the preservation and protection of museum objects what constitutes the single greatest threat to the collection, and you will almost always receive the same answer: fire. Fire is the greatest hazard to museums because it can so quickly and permanently destroy an object, a collection, or even an entire building. Stolen objects can be recovered, and those damaged by vandalism, water, mold, or environmental hazards often can be restored. But objects reduced to ashes never can be resurrected.

Although most people in the museum field would agree that fire is their worst enemy, there is no consensus on what means should be used to protect museums and collections against fire. Too often, fire protection is left to chance.

Some museums might argue that they have an exemplary fire prevention program—that is, they maintain good housekeeping and inspection procedures—and almost everyone will point out that the local fire department is just minutes away. Other museum professionals tout the noncombustible construction of their buildings, and still others are proud of their fine fire *detection* systems.

None of these "solutions," however, excludes the possibility of a major fire occurring, a fact that history has demonstrated time and again. Let's review some specific examples:

- The Huntington Library, Art Collections, and Botanical Gardens in California had a sophisticated fire detection system, good housekeeping procedure, noncombustible building construction, and an excellent fire department. But in 1985, a fire in an elevator shaft burst into the gallery and destroyed an irreplaceable 18th-century portrait.
- The Byer Museum of Art in Evanston, Ill., also had a sophisticated fire detection system, but it failed to detect a fire on New Year's Eve in 1984. The fire, which destroyed the top two floors of the three story museum, originated within the walls and was attributed to an electrical fault.
- Although the Museum of Modern Art in Rio de Janeiro was built of concrete and glass, it was reduced to rubble in a 1978 fire that also destroyed more than 90 percent of its art collection.
- That same year, a fire attributed to arson destroyed the San Diego Aerospace Museum despite the prompt response and best efforts of the fire department.

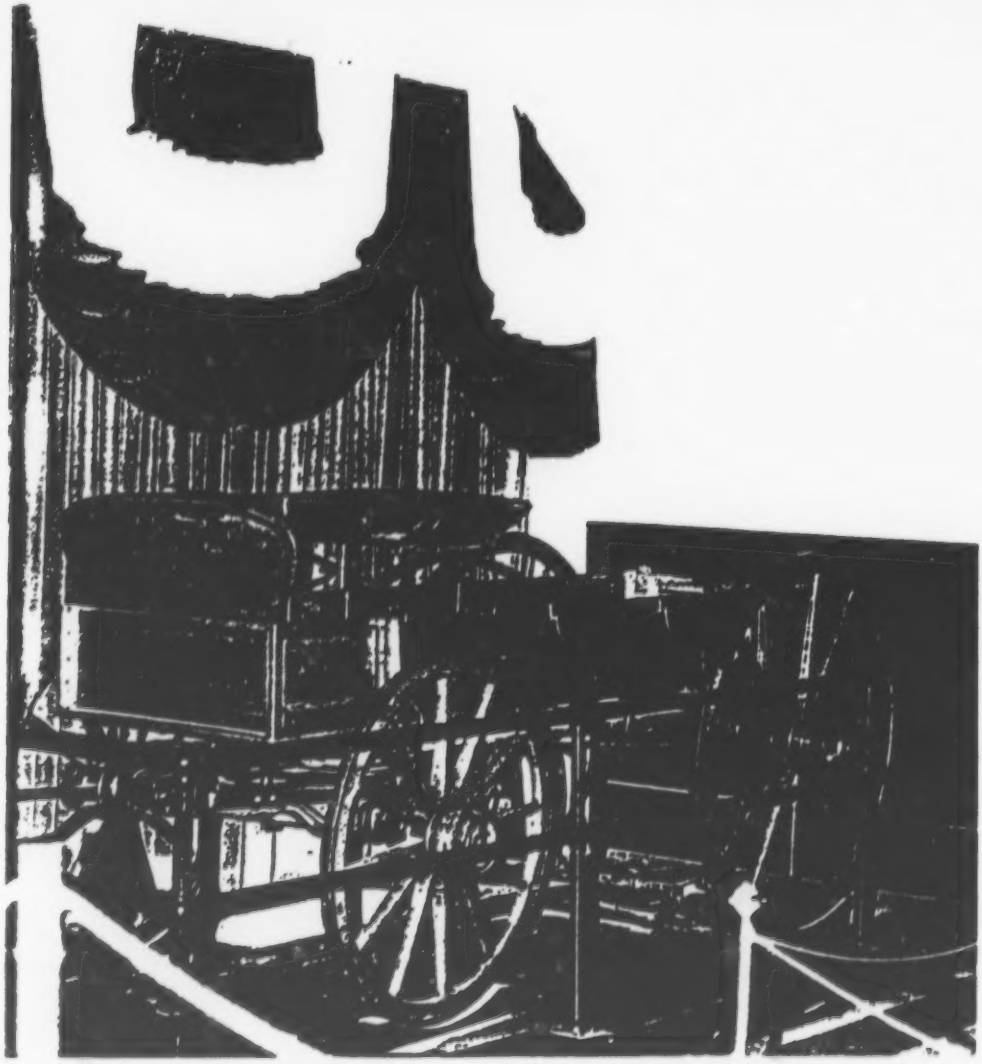
In fact, many museums both in the U.S. and abroad have experienced fires, but few get widespread publicity. Some museum people still are unaware of the tragic Cabildo (Louisiana State Museum) fire in May 1988 (see related article on page 70). Few know about the John C. Calhoun Mansion museum fire that took place the same month in South Carolina, or even the Los Angeles County Museum of Art fire in April this year (there was no damage to collections).

Beyond Fire Detection

A good housekeeping program, of course, will go a long way toward preventing fires, but even the best museums get sloppy from time to time—especially when constructing or dismantling exhibits. Even assuming impeccable neatness, the risk of fire always is present. Those museums with fire detection systems are off to a good start, but museum professionals need to keep in mind that fire detectors only *detect* fires; fire extinguishment must still take place. The extent of fire damage usually increases exponentially with the seconds that pass between the time an alarm is received and the time trained response personnel begin fighting the fire.

The worst response a museum can give to how it protects its collections from fire is this:

J. Andrew Wilson is a fire protection engineer and chief of the Fire Protection Division at the Smithsonian Institution, Washington, D.C.



Installing sprinklers—such as this system at the Smithsonian Institution's Arts and Industry Building in Washington, D.C.—is a practice that could preserve many museum collections, according to experts in fire prevention and suppression

"The fire department is just minutes or blocks away." Every museum fire cited in this article had a highly trained fire department that responded promptly after receiving the alarm. Unfortunately, the fire department is no guarantee that the museum will not suffer a catastrophic loss.

You don't have to look far to find a common basis for all major fire losses in museums—lack of an automatic fire suppression system. In my view, an automatic fire suppression system is the single most important fire safety system a museum can have.

For museum purposes, automatic fire suppression systems generally fall into two categories: automatic sprinklers and Halon.

I will discuss Halon only briefly, because I do not expect it to be around much longer. Halon 1301 (as it is technically known) is a colorless, odorless, electrically nonconductive gas that is very effective in extinguishing surface burning fires. Because it leaves no residue and is not known to chemically harm objects, Halon has long been touted as the panacea for protecting cultural properties from fire.

Unfortunately, I believe its virtues have often been overstated and its drawbacks understated. Anyone who reads the newspapers will be aware that Halon is listed with chlorofluorocarbons (C.F.C.s) as an ozone depleter. In fact, Halon 1301 is much more destructive to the ozone than most C.F.C.s. As the extent of the ozone depletion problem increases, so do the calls to cease production of the chemicals depleting it. The U.S. Environmental Protection Agency is pushing to phase out Halon. I expect this to happen in the not-too-distant future, so I recommend that those now thinking of purchasing Halon

rinklers: How One Wary Director Became a True Believer

ng watched a fire destroy the
r, attic, and roof of the his-
bildo in New Orleans's
ch Quarter—and having seen
less furniture turned to ashes—
s has turned from a non-be-
r to a true believer in sprinkler
ms.

ly, I've become a believer,
our experience," says
k, director of the Louisiana State
um, of which the Cabildo is a
t. "I have no reservations
ng a sprinkler system in the
do now."

over the next 18 months,
ruction of the Cabildo pro-
gresses, sprinkler systems will be installed throughout the building, the site of the 1803 transfer of territory in the Louisiana Purchase. Sefcik says a wet-pipe system will be installed in the building's three floors and attic, and a dry-pipe system will be installed in the building's first floor arcade. In addition, a wet-pipe system is being installed in four adjacent buildings that are part of the museum complex.

Sefcik says that before the May 1988 fire, he followed the "conventional wisdom," which rejected sprinklers for many museum applications.

"I was always taught you don't put sprinkler systems in a museum," he says. "I always felt the risk of water damage outweighed the risk of fire."

But Sefcik quickly changed his mind when the local fire chief told him that although a sprinkler might produce approximately 25 gallons of water per minute, the fire trucks used to put out the Cabildo fire each pumped thousands of gallons per minute.

Says Sefcik: "Had there been a sprinkler system in the area below the roof [where the fire began], that fire probably would have been contained."—*Evan Roth*

systems should seriously reconsider.

The automatic sprinkler is one of the most misunderstood systems in the museum community. In its simplest form, a sprinkler system is a network of overhead pipes (with or without water in them) connected to a water supply. Attached to these pipes, at regularly spaced intervals, are automatic sprinkler heads. Each head is individually heat activated. When a fire occurs, only the sprinkler or sprinklers directly exposed to the fire will open and discharge water. Not all sprinklers open, as many people believe. In fact, rarely does it take more than one or two sprinkler heads to control or extinguish a fire.

A common misconception and fear expressed by museum people is that sprinkler heads will inadvertently discharge. The chance of a sprinkler head activating because of a manufacturing defect is less than one in a million. This statistic comes from the insurance industry, which has been an ardent supporter of sprinklers since their development more than 100 years ago.

Automatic sprinkler heads are manufactured in a wide array of shapes, sizes, styles, and even colors to meet practically any aesthetic consideration. All sprinkler heads work basically the same way. The sprinkler is held shut or sealed by an element that will fuse (melt) or break away at a predetermined temperature (normally 165 degrees Fahrenheit). Water will then flow out of the opened head onto the fire.

One type of sprinkler head available today is designed to shut itself off after applying the absolute minimum amount of water needed to control or extinguish a fire. Commonly referred to as a "flow control" or "on-off" sprinkler head, it will reactivate should the fire break out again and can cycle on and off as often as necessary. This type of sprinkler is appealing for protecting collections, because it further reduces the water damage that can result from fighting a fire.

The various types of automatic sprinkler systems all have certain features in common. Each has a control valve where the system can be turned off, a waterflow alarm that activates when water movement occurs within the pipes (and generally transmits the alarm to a control room), and an automatic sprinkler head that distributes the water.

In a "wet pipe" system, overhead pipes are filled with water, and the system always is ready for operation. This type of system is the simplest and most reliable of all automatic sprinkler systems. A wet-pipe system should not be used in spaces subject to freezing temperatures or where mechanical damage to the pipes is likely.

In a "pre-action system," overhead pipes are normally dry. A supplemental fire detection system must be installed in the same area as the sprinklers. Activation of this supplement releases a valve that allows water to fill the pipes, essentially converting the system to a wet-pipe system. Water is not released until a sprinkler head is activated.

This type of system minimizes the possibil-

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SELECTED READINGS

Selected Readings

Anderson, Hazel, and John E. McIntyre. *Planning Manual for Disaster Control in Scottish Libraries and Record Offices*. Edinburgh: National Library of Scotland, 1985.

This brief manual is written in an outline form that makes it exceptionally easy to use.

Association of Records Managers and Administrators, Inc. *ARMA International Guideline for Records and Information Management: Magnetic Diskettes--Recovery Procedures*. Prairie Village, KS: Association of Records Managers and Administrators, Inc., 1987.

This publication provides a good step-by-step description of how to recover data from diskettes damaged by any type of water-soluble contaminants, including water, soft-drink and coffee spills. It does NOT cover the recovery of diskettes in hard plastic jackets.

Association of Research Libraries Office of Management Services. "Insuring Library Collections and Buildings." *SPEC Kit* 178. Washington, DC: Association of Research Libraries Office of Management Services, October, 1991.

This publication contains examples from several libraries illustrating insurance coverage, collection valuation, and losses and claims.

Barton, John P., and Johanna G. Wellheiser, eds. *An Ounce of Prevention: A Handbook for Disaster Contingency Planning for Archives, Libraries and Record Centres*. Toronto: Toronto Area Archivists Group, 1985.

This is considered one of the best general manuals for disaster preparedness. It gathers together most of the information someone involved in disaster planning would need. Its scope is broadly construed and includes such topics as housekeeping, environmental control, and security. Examples and lists of suppliers and human resources reflect TAAG's Canadian audience.

California Library Association Earthquake Relief Grant Ad Hoc Committee. *Earthquake Preparedness Manual for California Libraries*. Sacramento, CA: California Library Association, 1990.

This publication is an excellent practical guide about earthquake preparedness and response. It was written after the Loma Prieta earthquake of October 17, 1989, as a quick reference to aspects of earthquake preparedness learned from the Loma Prieta. In addition to information about preparing for collections emergencies caused by earthquakes, it covers how to ensure the safety of people, handling the staff's and public's stress, community information services, and working with FEMA.

England, Claire, and Evans, Karen. *Disaster Management for Libraries: Planning and Process*. N.p.: Canadian Library Association, 1988.

This publication is filled with useful information on disaster management, including

information not easily found elsewhere in the literature. It contains three sections covering: anticipating disaster, reacting to disaster, and preserving collections.

Fortson, Judith. *Disaster Planning and Recovery: A How-To-Do-It Manual for Librarians and Archivists*. How-To-Do-It Manuals for Libraries, no. 21. New York: Neal-Schuman Publishers, Inc., 1992.

This is an excellent manual that incorporates the most recent information on the subject. The first three chapters cover fire, water, and wind. The next three chapters discuss recovery, developing a plan, and managing risk.

Foundation of the American Institute for Conservation of Historic and Artistic Works. *Perspectives on Natural Disaster Mitigation: Papers Presented at 1991 AIC Workshop*. Washington, D.C.: Foundation of the American Institute for Conservation of Historic and Artistic Works, 1991.

These papers' emphasis on natural disasters offers a different slant from that found in most library literature. Some of the more interesting papers touch on people's emotional reactions to disasters; local government's role in responding to community-wide disasters; and protecting historic structures from hurricanes and earthquakes.

Hendriks, Klaus B. and Brian Lesser. "Disaster Preparedness and Recovery: Photographic Materials." *American Archivist* 46 no. 1 (Winter 1983): 52-68.

The results of the research and testing experiments reported in this article have formed the basis of most subsequent recommendations for the salvage of water-damaged still photographic negatives and prints in black-and-white and color.

Isner, Michael S. "Fire In Los Angeles Central Library Causes $22 Million Loss." *Fire Journal* (March-April 1987): 56-79.

This document contains a detailed description of how the 1986 Los Angeles Central Library fire spread and was fought. It is a graphic reminder of the very real danger libraries face from fire and of the importance of adequate fire protection.

Lee, Mary Wood. *Prevention and Treatment of Mold in Library Collections with an Emphasis on Tropical Climates*. RAMP Study PGI-88/WS/9. Paris: General Information Programme and UNISIST, United Nations Educational, Scientific and Cultural Organization, 1988.

Although this was written primarily as a practical guide for the prevention and basic treatment of mold growth in tropical climates, it contains useful advice for libraries in temperate climates as well. It emphasizes measures that do not rely on elaborate environmental control systems, extensive fumigation, or major conservation treatment. It corrects faulty common assumptions made by librarians forced to deal with mold growth.

Lundquist, Eric G. *Salvage of Water Damaged Books, Documents, Micrographic and Magnetic Media*. San Francisco: Document Reprocessors, 1986.

This publication describes two disasters in which Document Reprocessors assisted with recovery: the 1985 Dalhousie University fire and the flood in Roanoke, Virginia, caused by the aftereffects of a hurricane. It provides practical tips for all steps of recovery and a useful comparison between isolated and area-wide disasters.

Matthews, Fred W. "Sorting a Mountain of Books." *Library Resources and Technical Services* (January/March 1987): 88-94.

In 1986, the Dalhousie University Law Library suffered a major fire with subsequent water damage, Repeated moving, drying, and cleaning operations thoroughly mixed the collection. The staff devised a system using computers that greatly simplified the sorting of 100,000 volumes into shelflist order.

Mathieson, David F. "Hurricane Preparedness: Establishing Workable Policies for Dealing with Storm Threats." *Technology & Conservation* (Summer 1983): 28-29.

This is a short article describing how the staff of the Mystic Seaport Museum protect the museum against hurricanes. It contains lessons even for institutions not threatened by hurricanes. It stresses the importance of reviewing the disaster plan every year, of periodic training and run-throughs, and of recovery planning.

Morris, John. *Managing the Library Fire Risk.* 2d ed. Berkeley, CA: University of California Office of Insurance and Risk Management, 1979. 147 pp.

The case studies of library fires in this publication dramatically illustrate the danger fires pose to libraries and the importance of automatic fire detection and suppression systems. Morris explains automatic fire protection systems clearly and in detail.

Murray, Toby. *Bibliography on Disasters, Disaster Preparedness and Disaster Recovery.* Tulsa, OK: Oklahoma Conservation Congress, 1991.

This publication comprises one of the most comprehensive and current bibliographies on the subject. It may be obtained free from its author: Toby Murray, Preservation Officer, University of Tulsa, Tulsa, OK 74104.

Myers, Gerald E. *Insurance Manual for Libraries.* Chicago: American Library Association, 1977.

This publication is a practical and lucid "how-to" insurance manual with a risk management approach written for library trustees, directors, and staff. It has a helpful glossary, and the appendices include sample risk management policy statements. May be slightly dated, but is still immensely useful.

Myers, James N., and Denise D. Bedford, eds. *Disasters: Prevention and Coping.* Proceedings of the Conference, May 21-22, 1980. Stanford: Stanford University Libraries, 1981.

This publication contains papers on a wide range of disaster topics, an interesting panel discussion about the 1978 Stanford flood, and details about how Stanford handled various aspects of the recovery. "Reducing Preservation Hazards Within Library Facilities" by Philip D. Leighton is a superb description of where problems can be found

in a building's shell and interior systems, e.g. roof, walls, plumbing, and ventilation.

A shorter and more formal account of the 1978 Stanford flood can be found in two articles: 1) Leighton, Philip D. "The Stanford Flood." *College & Research Libraries* (September 1979): 450-459; and 2) Buchanan, Sally. "The Stanford Library Flood Restoration Project." *College & Research Libraries* (November 1979): 539-548.

National Fire Protection Association. *NFPA 910: Recommended Practice for the Protection of Libraries and Library Collections*. Quincy, MA: National Fire Protection Association, 1991.

This ANSI-approved standard provides good introduction for improving the fire safety of both new and existing libraries. It includes information on technologies for fire detection and suppression.

Parker, Thomas. *Study on Integrated Pest Management for Libraries and Archives*. PGI-88/WS/20. Paris: General Information Program and UNISIST, United Nations Educational, Scientific and Cultural Organization, 1988.

This study describes the most common library pests (insects, rodents, and mold), the damage they cause to library collections, and how to control them using an approach called integrated pest management. It contains more information than the published version of a talk given by Parker that is included in this resource guide.

Shelton, John A. *Seismic Safety Standards for Library Shelving*. California State Library Manual of Recommended Practice: Sacramento: California State Library, 1989.

This publication presents specifications for the design and installation of library shelving expected to withstand the range of earthquakes commonly encountered in California.

Waters, Peter. *Procedures for Salvage of Water-Damaged Library Materials*. 2d ed. Washington, DC: Library of Congress, 1979.

This classic and seminal work is now somewhat dated. When referring to it, it is important to realize that the use of thymol is no longer recommended, since more recent studies have shown it to be a cardiac depressant and a possible carcinogen. In the years since this booklet was published, experience gained during subsequent disasters has allowed the refinement of some of the procedures set forth here.

Zycherman, Lynda A. and J. Richard Schrock, eds. *A Guide to Museum Pest Control*. Washington, DC: American Institute for the Conservation of Historic and Artistic Works and the Association of Systematics Collections, 1988.

This publication consists of a compilation of articles written for museum professionals, especially conservators, and is divided into four sections: policy, law and liability; pests and pest identification; treatment; and references. The section on policy, law, and liability is particularly useful.